UNITED STATES GOVERNMENT August 26, 2019
MEMORANDUM

To: Public Information
From: Plan Coordinator, OLP, Plans Section
(GM235D)

Subject: Public Information copy of plan

Control #	-	S-7931
Type	-	Supplemental Exploration Plan
Lease(s)	-	OCS-G 12209 Block - 200 Green Canyon Area
Operator	-	Fieldwood Energy Offshore LLC
Description	-	Subsea Wells TA010, TA012, TA014, TA016, TA017, and TA018
Rig Type	-	Not Found

Attached is a copy of the subject plan.

It has been deemed submitted as of this date and is under review for approval.

Michelle Griffitt Evans
Plan Coordinator

FIELDWOOD ENERGY

May 3, 2019

Bureau of Ocean Energy Management
Office of Leasing and Plans
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

Attn: Michelle Picou, *Chief, Plans Section*

Subject: **Supplemental Exploration Plan**
Fieldwood Energy Offshore LLC
Green Canyon Block 200
Lease No. OCS-G12209

In accordance with 30 CFR 550.200 Subpart B and NTL 2009-G07, Fieldwood Energy Offshore LLC (Fieldwood) hereby submits for your review and approval a Supplemental Exploration Plan for the following drilling, completion, and installation of subsea trees for the following six wells:

Green Canyon 200 TA010 (ST00 BP00)
Green Canyon 200 TA012 (ST00 BP00)
Green Canyon 200 TA014 (ST00 BP00)
Green Canyon 200 TA016 (ST00 BP00)
Green Canyon 200 TA017 (ST00 BP00)
Green Canyon 200 TA018 (ST00 BP00)

Please be advised that the original application was submitted on December 11, 2018 and this includes revisions in response to the "Request for Information" (RFI) dated January 29, 2019.

Enclosed you will find one Proprietary Copy and one Public Copy with a CD containing electronic copies of the plan.

Also included you will find Well Site Clearance Letters prepared for each well by Oceaneering International, Inc. There is one printed binder enclosed as well as an electronic copy on a CD in the binder itself.

If you should have any questions or concerns, please contact Ali Ferguson by phone at 713-969-1308 or by e-mail at ali.ferguson@fwellc.com.

Sincerely,

Ali Ferguson
Regulatory Specialist

SUPPLEMENTAL EXPLORATION PLAN

Green Canyon Block 200
Lease No. OCS-G12209

Substantive changes to the Supplemental Exploration Plan are noted in the table below.

Record of Change:

Date	Plan Section	Summary of Change
12/11/2018		Initial Submission
05/03/2019	All	Revised Plan to include all sections based on RFI dated 01/29/2019- resubmitted entire Public and Proprietary copies
05/21/2019	Plan Contents; Section B	**Proprietary**: Updated the Form BOEM-0137 for the A014 well to include corrected N/S Departure **Public**: Updated the Form BOEM-0137 for the A014 well to include corrected N/S Departure; added two attachments under Section B - "Well Site Clearance Letters" and "High Resolution Seismic Lines."
06/10/2019	Plan Contents; Section F	Updated tank capacities for drillship; removed references to DP semi-submersible as possible vessel. Updated AQR worksheets.
07/29/2019	Section A; Section G	Updated Blowout Scenario and OSRP/WCD information
08/06/2019	Section A	Updated Blowout Scenario

SUPPLEMENTAL EXPLORATION PLAN

PUBLIC Information Copy

Green Canyon Block 200
OCS-G12209

Submitted by: Fieldwood Energy Offshore LLC

FIELDWOOD ENERGY

Fieldwood Energy Offshore LLC

SUPPLEMENTAL EXPLORATION PLAN

Green Canyon Block 200
Lease No. OCS-G12209

Plan Contents (550.211)

a) Description, Objectives, and Schedule
b) Location
c) Drilling Unit
d) Service Fee

Section A: General Information (550.213)

a) Applications and Permits
b) Drilling Fluids
c) Chemical Products
d) New or Unusual Technology
e) Bonds, Oil Spill Financial Responsibility, and Well Control Statements
f) Suspensions of Operations
g) Blowout Scenario
h) Contact

Section B: Geological and Geophysical Information (550.214)

a) Geological Description
b) Structure Contour Maps
c) Two-Dimensional or Three-Dimensional Seismic Lines
d) Geological Cross-Sections
e) Shallow Hazards Report
f) Shallow Hazards Assessment
g) High-Resolution Seismic Lines
h) Stratigraphic Column
i) Time-Versus-Depth Chart
j) Geochemical Information
k) Future G&G Activities

Section C: Hydrogen Sulfide Information (550.215)

a) Concentration
b) Classification
c) H_2S Contingency Plan

Section D: Biological, Physical, and Socioeconomic Information (550.216)

a) Biological Environment Reports
b) Physical Environment Reports
c) Socioeconomic Study Reports

Section E: Solid and Liquid Wastes and Discharges Information (550.217)

a) Projected Wastes
b) Projected Ocean Discharges
c) National Pollutant Discharge Elimination System (NPDES) Permit
d) Modeling Report
e) Projected Cooling Water Intake

Section F: Air Emissions Information (550.218)

a) Projected Emissions
b) Emission Reduction Measures

Section G: Oil and Hazardous Substance Spills Information (550.219)

a) Oil Spill Response Planning
b) Modeling Report

Section H: Environmental Monitoring Information (550.221)

a) Monitoring Systems
b) Incidental takes
c) Flower Garden Banks National Marine Sanctuary

Section I: Lease Stipulations Information (550.222)

Section J: Mitigation Measures Information (550.223)

a) Measures Taken to Minimize or Mitigate Environmental Impacts
b) Incidental Takes

Section K: Support Vessels and Aircraft Information (550.224)

a) General
b) Air Emissions
c) Drilling Fluids and Chemical Products Transportation
d) Solid and Liquid Wastes Transportation
e) Vicinity Map

Section L: Onshore Support Facilities Information (550.225)

a) General
b) Air Emissions
c) Unusual Solid and Liquid Wastes
d) Waste Disposal.

Section M: Coastal Zone Management Information (550.226)

Section N: Environmental Impact Analysis Information (550.227)

Section O: Administrative Information (550.228)

a) Exempted Information Description
b) Bibliography

PLAN CONTENTS

(a) Description, Objectives, and Schedule

Fieldwood Energy Offshore LLC (Fieldwood) submits this Supplemental Exploration Plan (S-EP) to account for the drilling, completion, and subsea tree installation of the following six wells in Green Canyon Block 200: TA010, TA012, TA014, TA016, TA017 (relief well), and TA018.

Attached under this section is BOEM Form-0137 which includes the proposed activity schedule.

(b) Location

Well location plats showing the surface locations of the proposed wells along with bathymetry maps showing the water depths across the lease block are included under this section.

The vessel type(s) planned for the drilling of these wells are dynamically positioned (DP) and therefore no anchors will be necessary.

(c) Drilling Unit

Fieldwood will use a DP drillship with subsea BOPs and will comply with all of the regulations of the ABS, IMO and USCG. All drilling operations will be conducted under the provisions of 30 CFR, Part 250, Subpart D, and other applicable regulations and notice to lessees, including those regarding the avoidance of potential drilling hazards and safety and pollution prevention control. Such measures as inflow detection and well control, monitoring for loss of circulation and seepage loss, and casing design will be our primary safety measures.

Pollution prevention measures include installation of curbs, gutters, drip pans, and drains on drilling deck areas to collect all contaminants and debris. All discharges will be in accordance with applicable EPA NPDES permits.

Storage Tanks and Production Vessels (all facility tanks of 25 barrels or more)					
Type of Storage Tank	**Type of Facility**	**Tank Capacity (bbls)**	**Number of Tanks**	**Total Capacity (bbls)**	**Fluid Gravity (API)**
Fuel Oil (Marine Diesel)	DP Drillship	2,060	22	45,320	37°
Active Mud Pits	DP Drillship	1,488	4	5,952	< 10°
Reserve Liquid Mud Storage	DP Drillship	2,060	6	12,360	< 10°
Drill Water	DP Drillship	18,240	1	18,240	10°
Potable Water	DP Drillship	8,805	1	8,805	10°
Base Oil	DP Drillship	3,599	2	7,198	< 10°
Brine	DP Drillship	1,509	5	7,545	< 10°

(d) Processing Fee

A Pay.gov receipt is included under this section in the amount of $22,038.00 to cover the cost and processing fee for the proposed operations being conducted under this plan.

Attachments

1) Form BOEM-137 (*Attachment i*)
2) Surface Location Plats (*Attachment ii*)
3) Bathymetry Maps (*Attachment iii*)
4) Pay.Gov Receipt (*Attachment iv*)

OCS PLAN INFORMATION FORM

General Information

Type of OCS Plan:	X	Exploration Plan (EP) Supplemental EP	Development Operations Coordination Document (DOCD)		

Company Name: Fieldwood Energy Offshore LLC	BOEM Operator Number: 03035
Address:	Contact Person: Ali Ferguson
2000 W. Sam Houston Pkwy S., Suite 1200	Phone Number: 713-969-1308
Houston, TX 77042	E-Mail Address: ali.ferguson@fwellc.com

If a service fee is required under 30 CFR 550.125(a), provide the	Amount paid	$22,038.00	Receipt No.	Pay.Gov No. 26DUCQMR

Project and Worst Case Discharge (WCD) Information

Lease(s): OCS-G12209	Area: Green Canyon	Block(s): 200	Project Name (If Applicable):								
Objective(s)	X	Oil	X	Gas		Sulphur		Salt	Onshore Support Base(s):	Fieldwood Shorebase in Port Fourchon	
Platform/Well Name: 6 "TA" Subsea Wells	Total Volume of WCD: 466,610 BOPD								API Gravity:	32°	
Distance to Closest Land (Miles): 88 miles	Volume from uncontrolled blowout: 466,610 BOPD										

Have you previously provided information to verify the calculations and assumptions for your WCD?	X	Yes		No
If so, provide the Control Number of the EP or DOCD with which this information was provided	Revised EP Control No. R-6856			
Do you propose to use new or unusual technology to conduct your activities?		Yes	X	No
Do you propose to use a vessel with anchors to install or modify a structure?		Yes	X	No
Do you propose any facility that will serve as a host facility for deepwater subsea development?		Yes	X	No

Description of Proposed Activities and Tentative Schedule (Mark all that apply)

Proposed Activity	Start Date	End Date	No. of Days
GC 200 TA010: Exploration drilling, completion & install subsea tree	03/01/2020	04/29/2020	60
GC 200 TA018: Exploration drilling, completion & install subsea tree	04/30/2020	06/28/2020	60
GC 200 TA012: Exploration drilling, completion & install subsea tree	03/01/2021	04/29/2021	60
GC 200 TA014: Exploration drilling, completion & install subsea tree	04/30/2021	06/28/2021	60
GC 200 TA016: Exploration drilling, completion & install subsea tree	03/01/2022	04/29/2022	60
GC 200 TA017: Exploration drilling, completion & install subsea tree	04/30/2022	06/28/2022	60

Description of Drilling Rig

	Jackup	X	Drillship
	Gorilla Jackup		Platform rig
	Semisubmersible		Submersible
	DP Semisubmersible		Other (Attach Description)
Drilling Rig Name (If Known): Rowan Resolute			

Description of Structure

	Caisson		Tension leg platform
	Fixed platform		Compliant tower
	Spar		Guyed tower
	Floating production system		Other (Attach Description)

Description of Lease Term Pipelines

From (Facility/Area/Block)	To (Facility/Area/Block)	Diameter (Inches)	Length (Feet)

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): TA010					Previously reviewed under an approved EP or DOCD?		Yes	X	No		
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A - not currently existing					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?							X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G12209	OCS	OCS OCS
Area Name	Green Canyon		
Block No.	200		
Blockline Departures (in feet)	N/S Departure: F_S_ L 7,743.00' FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F_E_ L 5,878.00' FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 2,370,122.00'	X:	X: X: X:
	Y: 10,081,983.0'	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 27° 45' 52.483" N	Latitude	Latitude Latitude Latitude
	Longitude 90° 44' 35.411" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 2,525 feet MSL		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A	

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Public Attachment i

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): TA012					Previously reviewed under an approved EP or DOCD?		Yes	X	No		
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A - not currently existing					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?							X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G12209	OCS	OCS OCS
Area Name	Green Canyon		
Block No.	200		
Blockline Departures (in feet)	N/S Departure: F_N_ L 2,235.72' FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F_W_ L 7,171.95' FWL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 2,367,331.93'	X:	X: X: X:
	Y: 10,087,844.28'	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 27° 46' 51.007" N	Latitude	Latitude Latitude Latitude
	Longitude 90° 45' 05.263" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 2,361 feet MSL		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A	

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Public Attachment i

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): TA014					Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A - not currently existing				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?							X Yes		No	
WCD info	For wells, volume of uncontrolled blowout (Bbls/day):		For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid				

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G12209	OCS	OCS OCS
Area Name	Green Canyon		
Block No.	200		
Blockline Departures (in feet)	N/S Departure: F_N_ L 4,758.10' FNL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F_E_ L 5,679.31' FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 2,370,320.69'	X:	X: X: X:
	Y: 10,085,321.90'	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 27° 46' 25.497" N	Latitude	Latitude Latitude Latitude
	Longitude 90° 44' 32.518" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 2,486 feet MSL		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A	

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): TA016					Previously reviewed under an approved EP or DOCD?		Yes	X	No	
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A - not currently existing				
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?							X Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G12209	OCS	OCS OCS
Area Name	Green Canyon		
Block No.	200		
Blockline Departures (in feet)	N/S Departure: F_S_ L 5,821.86' FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F_E_ L 4,384.51' FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 2,371,615.49'	X:	X: X: X:
	Y: 10,080,061.86'	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 27° 45' 33.195" N	Latitude	Latitude Latitude Latitude
	Longitude 90° 44' 19.186" W	Longitude	Longitude Longitude Longitude
	Water Depth (Feet): 2,594 feet MSL	MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
	Anchor Radius (if applicable) in feet:	N/A	

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Public Attachment i

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

Well or Structure Name/Number (If renaming well or structure, reference previous name): TA017					Previously reviewed under an approved EP or DOCD?		Yes	X	No		
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A - not currently existing					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?							X	Yes		No	

WCD info	For wells, volume of uncontrolled blowout (Bbls/day):	For structures, volume of all storage and pipelines (Bbls):	API Gravity of fluid	

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G12209	OCS	OCS OCS
Area Name	Green Canyon		
Block No.	200		
Blockline Departures (in feet)	N/S Departure: F_S_ L 4,371.00' FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F_E_ L 1,853.00' FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 2,374,147.00'	X:	X: X: X:
	Y: 10,078,611.00'	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 27° 45' 18.372" N	Latitude	Latitude Latitude Latitude
	Longitude 90° 43' 51.317" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 2,676 feet MSL		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in feet:		N/A	

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Public Attachment i

OCS PLAN INFORMATION FORM (CONTINUED)
Include one copy of this page for each proposed well/structure

Proposed Well/Structure Location

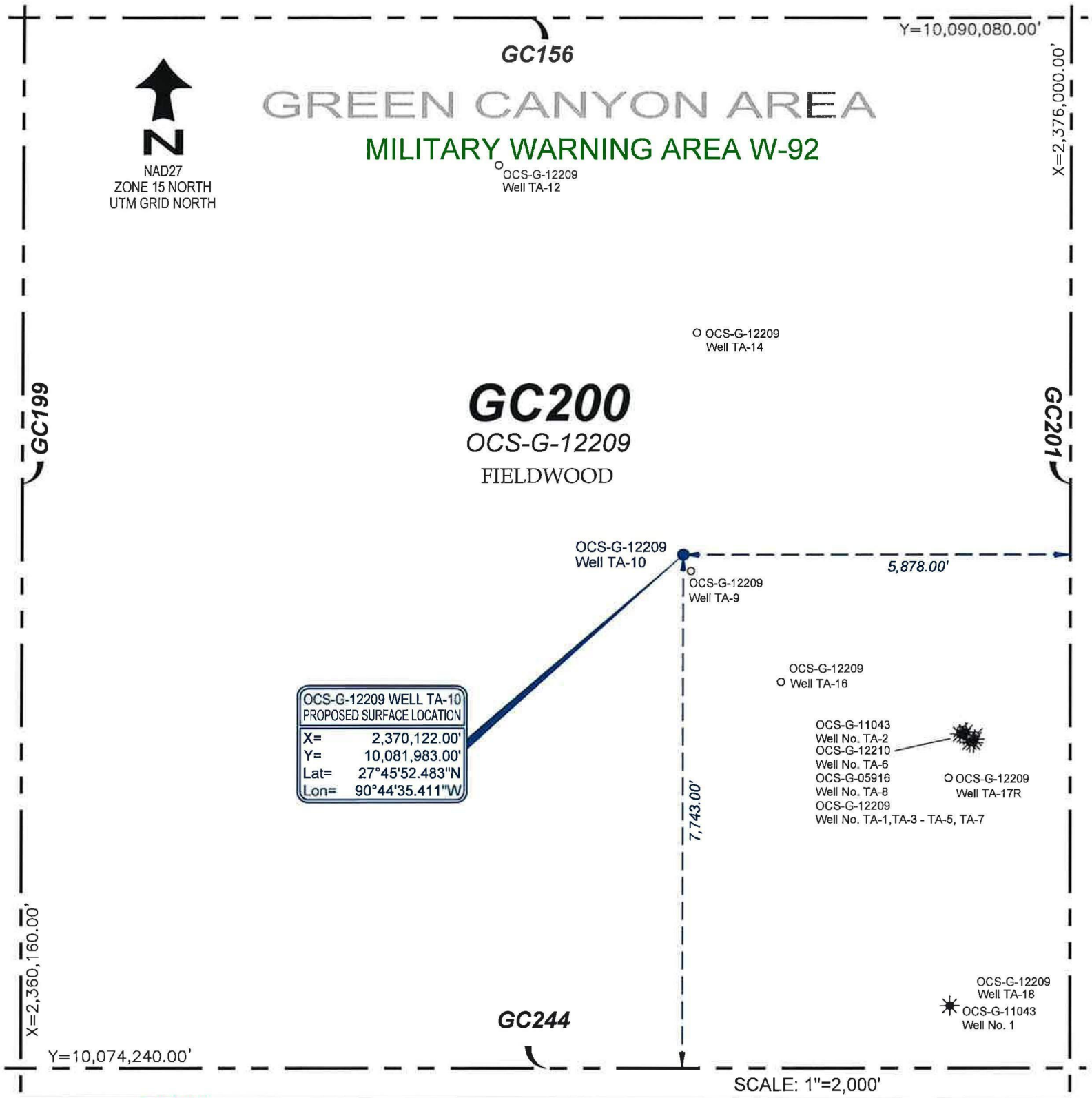
Well or Structure Name/Number (If renaming well or structure, reference previous name): TA018					Previously reviewed under an approved EP or DOCD?		Yes	X	No		
Is this an existing well or structure?		Yes		No X	If this is an existing well or structure, list the Complex ID or API No.	N/A - not currently existing					
Do you plan to use a subsea BOP or a surface BOP on a floating facility to conduct your proposed activities?							X	Yes		No	
WCD info	For wells, volume of uncontrolled blowout (Bbls/day):		For structures, volume of all storage and pipelines (Bbls):			API Gravity of fluid					

	Surface Location	**Bottom-Hole Location (For Wells)**	**Completion (For multiple completions, enter separate lines)**
Lease No.	OCS OCS-G12209	OCS	OCS OCS
Area Name	Green Canyon		
Block No.	200		
Blockline Departures (in feet)	N/S Departure: F_S_ L 1,294.10' FSL	N/S Departure: F____ L	N/S Departure: F____ L N/S Departure: F____ L N/S Departure: F____ L
	E/W Departure: F_E_ L 1,544.29' FEL	E/W Departure: F____ L	E/W Departure: F____ L E/W Departure: F____ L E/W Departure: F____ L
Lambert X-Y coordinates	X: 2,374,455.71'	X:	X: X: X:
	Y: 10,075,534.10'	Y:	Y: Y: Y:
Latitude/ Longitude	Latitude 27° 44' 47.859" N	Latitude	Latitude Latitude Latitude
	Longitude 90° 43' 48.514" W	Longitude	Longitude Longitude Longitude
Water Depth (Feet): 2,758 feet MSL		MD (Feet): / TVD (Feet):	MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet): MD (Feet): / TVD (Feet):
Anchor Radius (if applicable) in feet:	N/A		

Anchor Locations for Drilling Rig or Construction Barge (If anchor radius supplied above, not necessary)

Anchor Name or No.	Area	Block	X Coordinate	Y Coordinate	Length of Anchor Chain on Seafloor
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	
			X =	Y =	

Public Attachment i



I, RALPH A. COLEMAN, HEREBY CERTIFY THAT THE ABOVE PROPOSED SURFACE LOCATION IS CORRECT.

STATE OF LOUISIANA
RALPH A. COLEMAN
REG. No. 4691
REGISTERED PROFESSIONAL LAND SURVEYOR

RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

PUBLIC INFORMATION

FIELDWOOD ENERGY

OCS-G-12209 Well TA-10
BLOCK 200 - GREEN CANYON AREA

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 198253	DRW: MCM	DATE: APRIL 2, 2019
CKD: EJB	APP: RAC	SHEET 1 of 1
DOC: 198253-OII-DRW-APD-001-01		REV. 0

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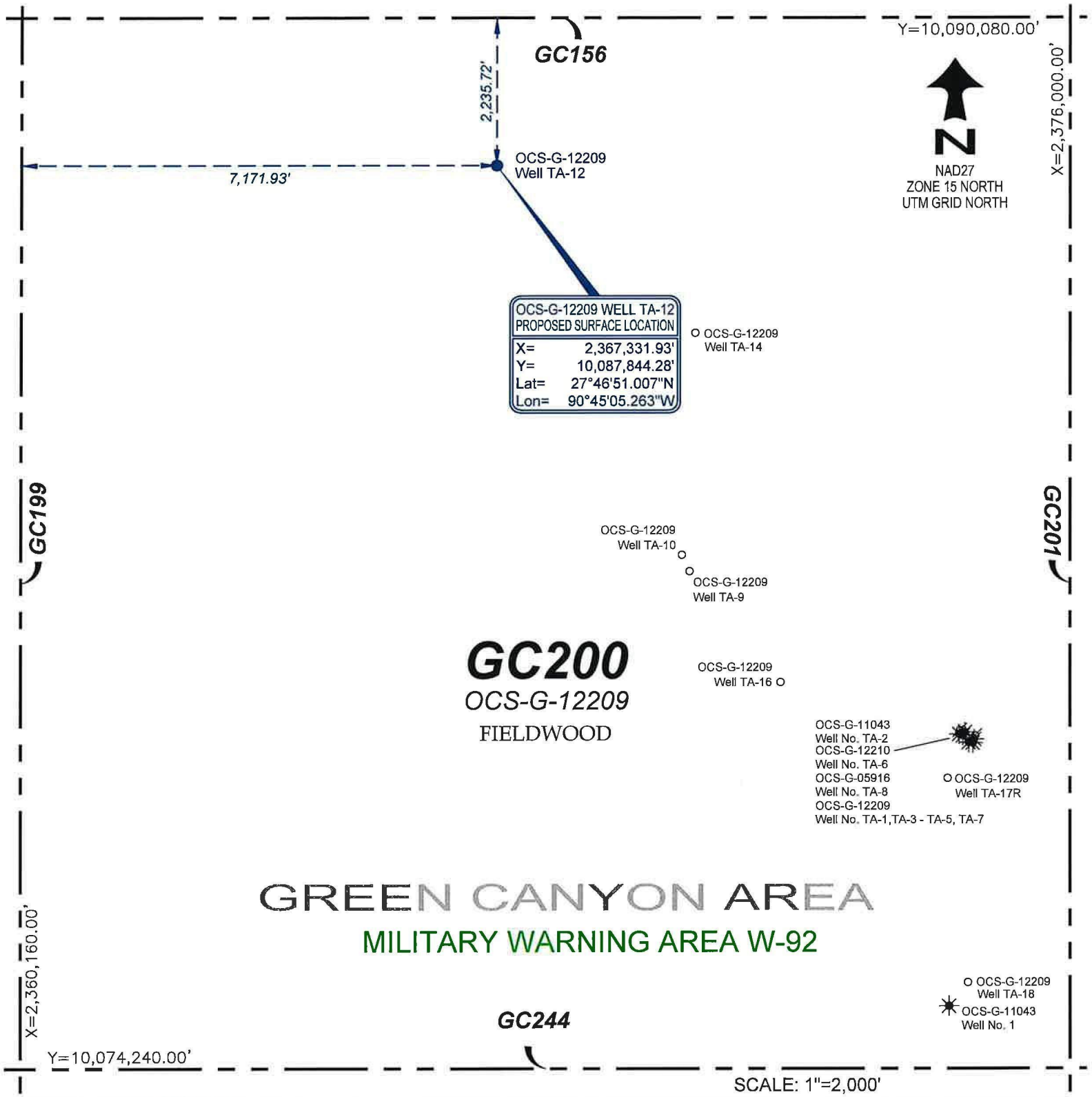

I, RALPH A. COLEMAN, HEREBY CERTIFY THAT THE ABOVE PROPOSED SURFACE LOCATION IS CORRECT.

STATE OF LOUISIANA
RALPH A. COLEMAN
REG. NO. 4691
REGISTERED
PROFESSIONAL LAND SURVEYOR

RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

PUBLIC INFORMATION

FIELDWOOD ENERGY

OCS-G-12209 Well TA-12
BLOCK 200 - GREEN CANYON AREA

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 198253	DRW: MCM	DATE: APRIL 2, 2019
CKD: EJB	APP: RAC	SHEET 1 of 1
DOC: 198253-OII-DRW-APD-002-01		REV. 0

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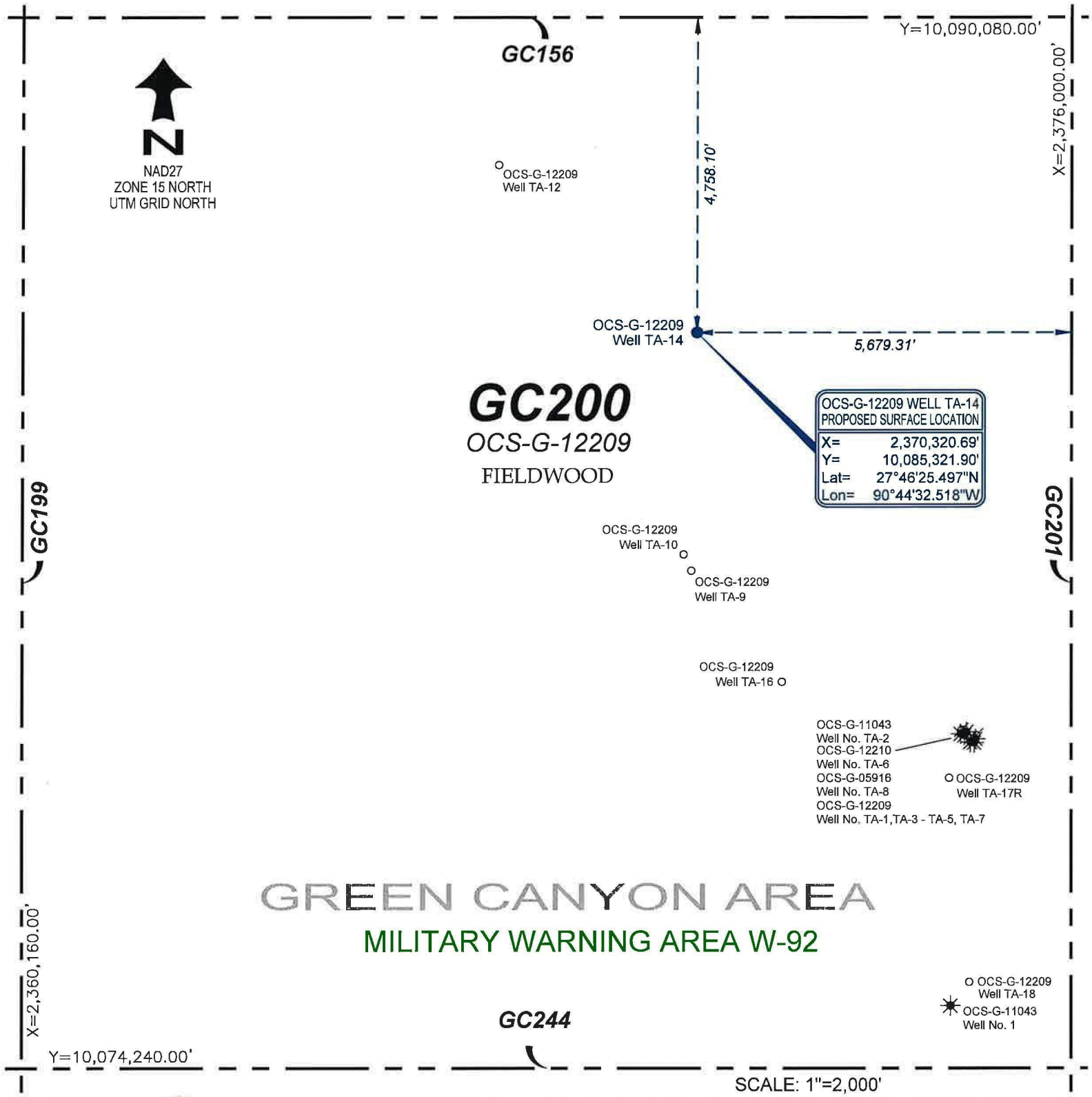

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RALPH A. COLEMAN
REG. No. 4691
REGISTERED
LAND SURVEYOR

RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

PUBLIC INFORMATION

FIELDWOOD ENERGY

OCS-G-12209 Well TA-14
BLOCK 200 - GREEN CANYON AREA

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 198253	DRW: MCM	DATE: APRIL 2, 2019
CKD: EJB	APP: RAC	SHEET 1 of 1
DOC: 198253-OII-DRW-APD-003-01		REV. 0

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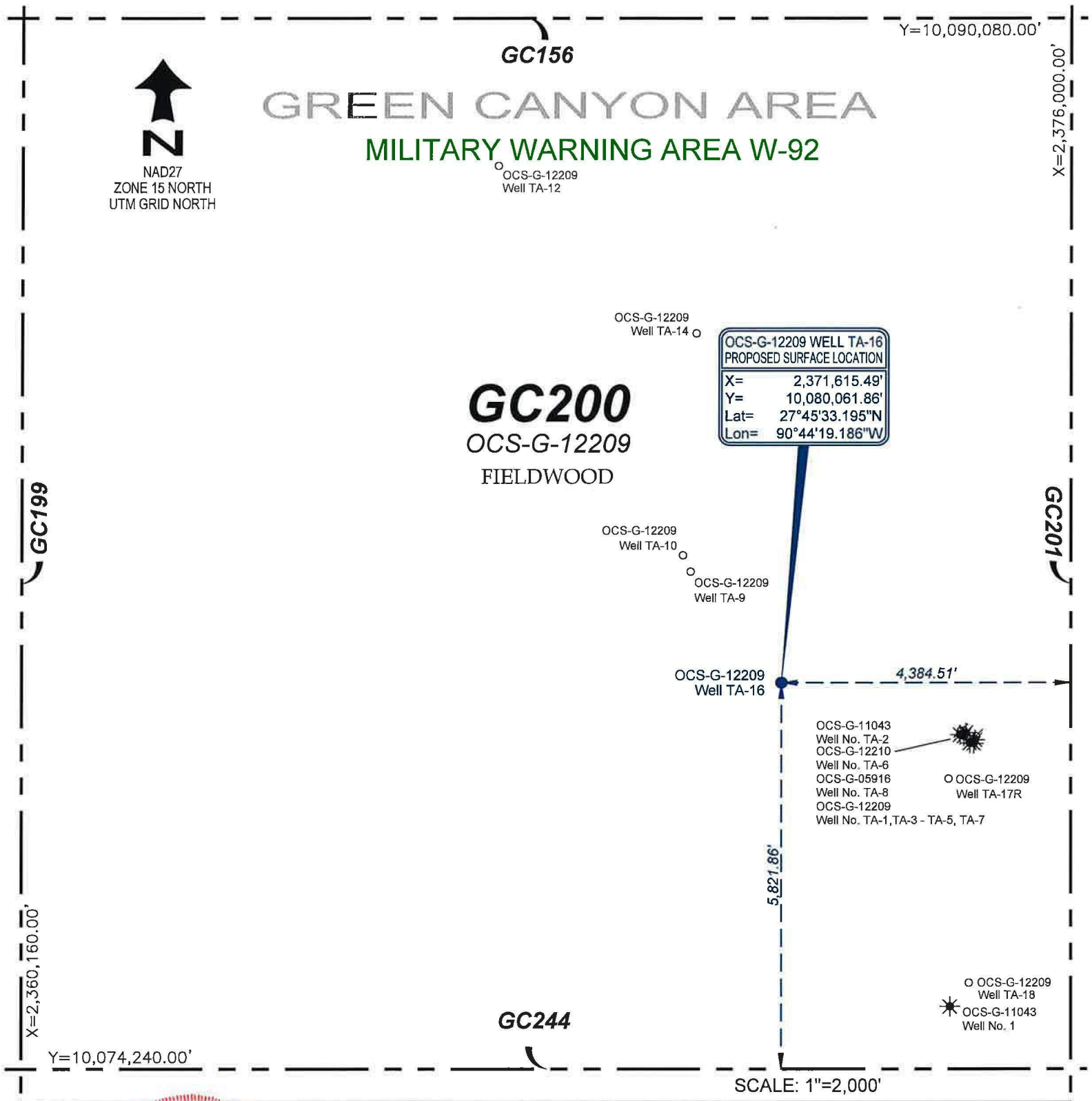

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STATE OF LOUISIANA
RALPH A. COLEMAN
REG. No. 4691
REGISTERED
PROFESSIONAL
LAND SURVEYOR

RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

PUBLIC INFORMATION

FIELDWOOD ENERGY

OCS-G-12209 Well TA-16
BLOCK 200 - GREEN CANYON AREA

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 198253	DRW: MCM	DATE: APRIL 2, 2019	
CKD: EJB	APP: RAC	SHEET 1 of 1	REV. 0
DOC: 198253-OII-DRW-APD-004-01			

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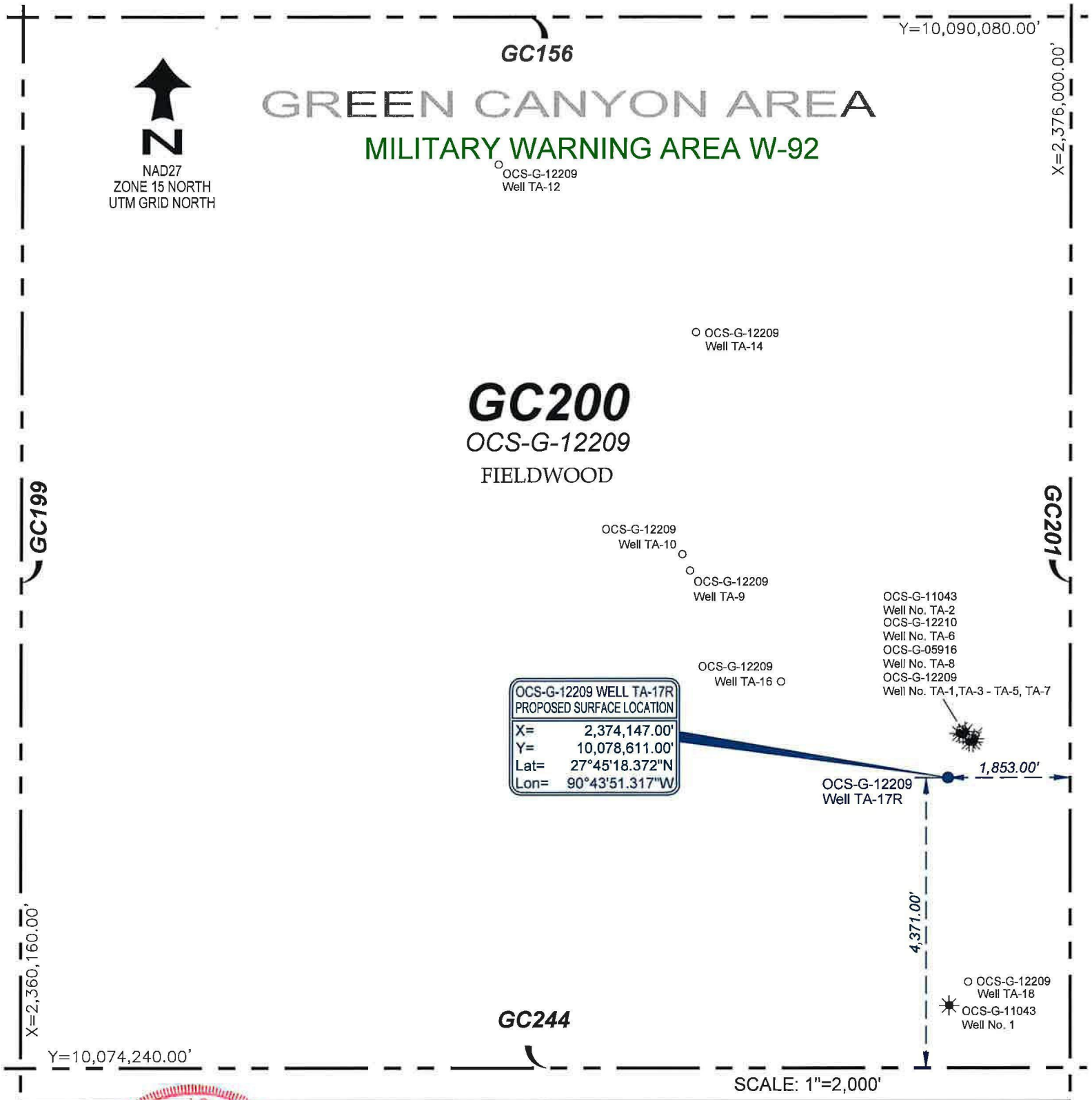

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RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

PUBLIC INFORMATION

FIELDWOOD ENERGY

OCS-G-12209 Well TA-17R
BLOCK 200 - GREEN CANYON AREA

PREPARED BY: OCEANEERING

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD,
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 198253	DRW: MCM	DATE: APRIL 2, 2019
CKD: EJB	APP: RAC	SHEET 1 of 1
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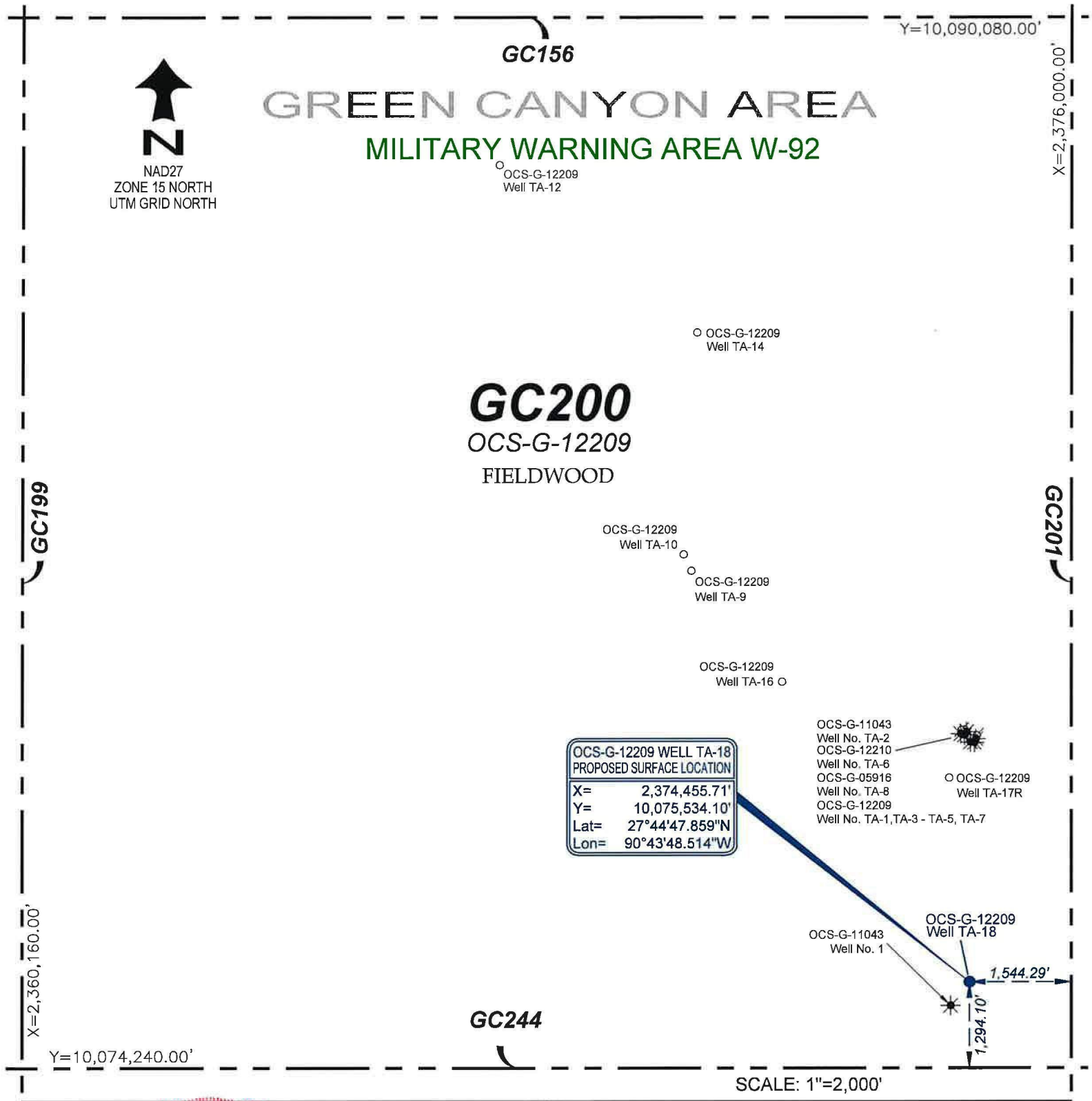

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RALPH A. COLEMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION No. 4691

PUBLIC INFORMATION

FIELDWOOD ENERGY

OCS-G-12209 Well TA-18
BLOCK 200 - GREEN CANYON AREA

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000
LA Reg. No. 747

JOB: 198253	DRW: MCM	DATE: APRIL 2, 2019
CKD: EJB	APP: RAC	SHEET 1 of 1 / REV. 0
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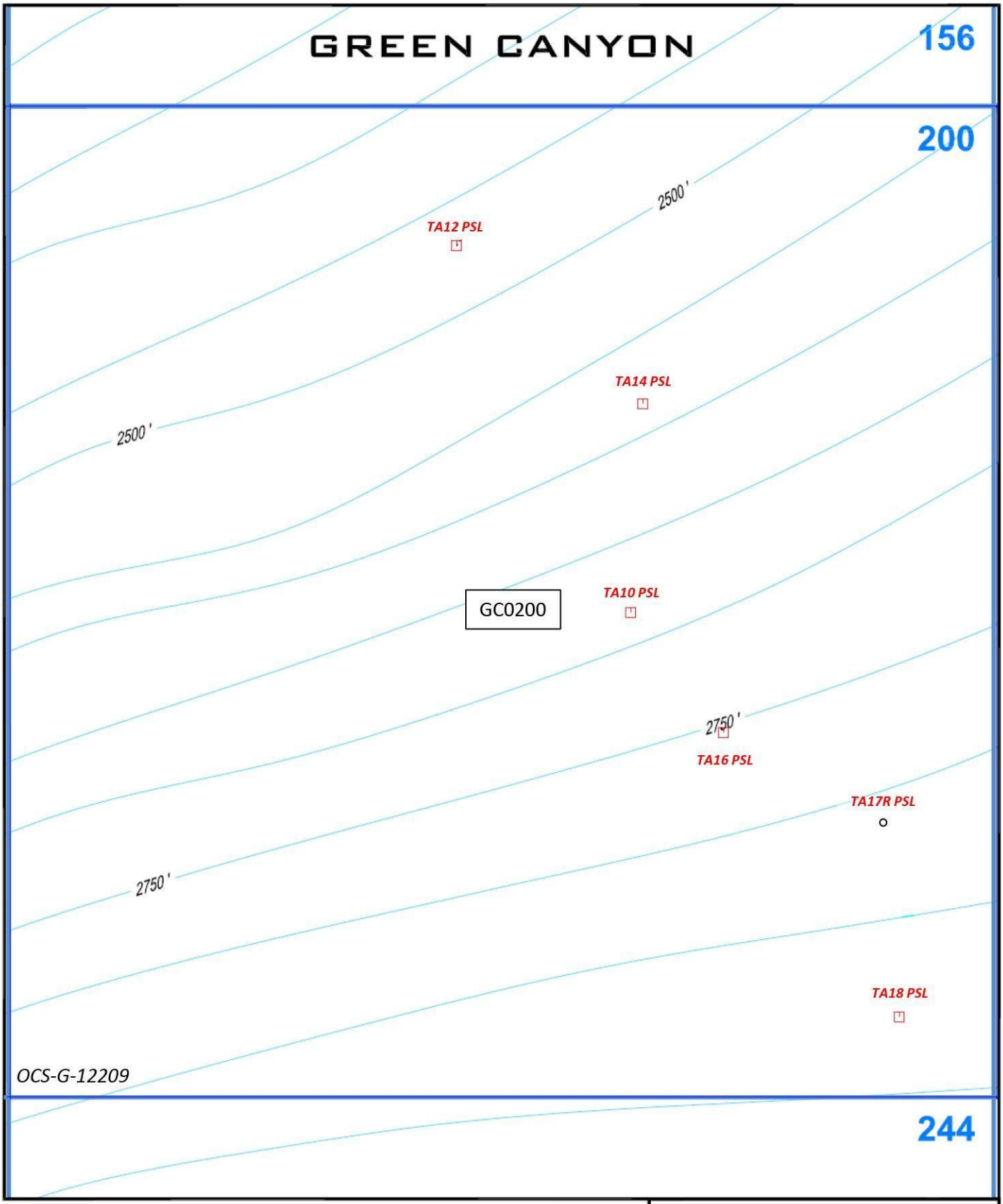


FIELDWOOD ENERGY

1"=2000'

Attachment iii

GREEN CANYON BLOCK 200
OFFSHORE LOUISIANA
Supplemental EP
Bathymetry

Ck:	SCALE: 1"=2000'	INTERP:	DATE: 11-29-2018

Pay.gov

Receipt

Tracking Information

Pay.gov Tracking ID: 26DUCQMR

Agency Tracking ID: 75630056203

Form Name: BOEM Exploration Plan

Application Name: BOEM Exploration Plan - BF

Payment Information

Payment Type: Debit or credit card

Payment Amount: $22,038.00

Transaction Date: 12/05/2018 01:52:02 PM EST

Payment Date: 12/05/2018

Region: Gulf of Mexico

Contact: Vanessa Villagran 713-969-1323

Company Name/No: Fieldwood Energy Offshore LLC, 03035

Lease Number(s): 12209, , , ,

Area-Block: Green Canyon GC, 200: , : , : , : ,

Surface Locations: 6

Cardholder Name: Fieldwood Energy

Card Type: Master Card

Card Number: **********8170

Attachment iv

SECTION A
GENERAL INFORMATION

(a) Applications and Permits

No additional applications or permits from other agencies are required to be submitted and/or approved at this time. An Application for Permit to Drill (APD) will be submitted to the appropriate Bureau of Safety and Environmental Enforcement (BSEE) District prior to commencing drilling operations.

(b) Drilling Fluids

Please see enclosed Table 1 titled, "*Wastes you will generate, treat, and downhole dispose or discharge to the GOM.*"

(c) Chemical Products

Chemical products information is not required for this S-EP per NTL No. 2008-G04.

(d) New or Unusual Technology

Fieldwood does not plan to use any new or unusual technology for the proposed operations being conducted under this plan.

(e) Bonds, Oil Spill Financial Responsibility, and Well Control Statements

The bond requirements for the activities and facilities proposed in this S-EP are satisfied by a $3,000,000.00 area-wide bond, furnished and maintained according to 30 CFR 556.901; NTL No. 2015-BOEM-N04 "General Financial Assurance;" and additional security under 30 CFR 556.901 (d) - (f) and NTL No. 2016-BOEM N01, "Requiring Additional Security."

Fieldwood (BOEM company number 03035) has demonstrated oil spill financial responsibility for the facilities proposed in this S-EP according to 30 CFR Part 553; and NTL No. 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities."

Fieldwood will have the financial capability to drill a relief well and conduct any other emergency well control operation.

(f) Suspension of Operations

Lease No. OCS-G12209 is held by unit production (Green Canyon 244 Unit Agreement Number 754393016). Per NTL 2008-G04, Suspension of Production information is only required for Development Operations Coordination Documents (DOCDs).

(g) Blowout Scenario

The worst case discharge well across Green Canyon Block 200 is the TA009 (ST01 BP00) well of which worst-case discharge information was submitted and approved under Revised Exploration Plan Control No.R-6856 on July 19, 2019. Fieldwood accepts and adheres to the blowout scenario approved under Control No.R-6856 and written below.

The Green Canyon Block 200 TA009 (ST01 BP01) proposed well has an estimated worst-case flow rate of 466,610 BOPD. The calculated worst-case duration of a blowout, if it had to be controlled with a relief well, is approximately 80 days. The calculated volume of oil from an 80-day blowout is estimated to be 30,334,000 bbls of oil.

The duration of the blowout will be a function of the well bridging over - the ability of surface/subsurface intervention - or a last resort would be drilling a relief well. The expected timeframes for the different outcomes would be:

1) Bridging over (1 to 4 days)
2) Surface intervention (14 to 30 days)
3) A relief well (80 days)

Discussion of potential for well to bridge over

The Green Canyon 200 TA009 well is an abnormally pressured oil well and the primary target is an unconsolidated oil sand. The pressure drop caused by an uncontrolled blowout could result in formation failure and a reasonably high chance of bridging over. Typical Gulf of Mexico (GOM) wells usually have a strong chance of sanding up or bridging over due to the high amount of solids that would be produced from formation collapse as the pressure in the wellbore is reduced. We typically expect 1-4 days to bridge over. Bridging over is a common outcome of conventional GOM well blowout. Equipment is being moved to location for a surface/subsurface intervention during this period.

Discussion of likelihood for surface intervention to stop blowout

Surface and subsurface intervention would be viable as long as the subsea wellhead and subsea BOPs are not damaged beyond use. Surface/subsurface intervention would be the first line of defense after a blowout occurs - the actual intervention technique chosen will depend on actual conditions and ability to access the existing well. There can be simple solutions such as rig up and set a plug in the casing, using an ROV to remotely access the BOP system, or more complex solutions such as stabbing over a capping stack and closing the well. The solution will depend on actual conditions. A surface/subsurface intervention is faster than a relief well and is usually started as conditions permit and can be done while relief well planning is being conducted. Fieldwood is a member of HWCG and has contracts in place with well control companies in order to execute surface/subsurface intervention and relief well planning. Typical blowouts can be controlled with surface/subsurface intervention.

Relief Well

A MODU would be used to drill a relief well. The water depth is 2,532' which does not limit the selection of a DP semi-submersible or a DP drillship.

Fieldwood currently has the Rowan Resolute rig under contract for this project. Should the Resolute be out of commission, Fieldwood has access to mutual aid rigs through HWCG membership and Rowan has advised they are willing to make one of their other two drillships in the GOM available.

The total time to drill the relief well is 80 days

Time to Acquire Rig: 15 days
Tow Time: 5 days
Drilling Time: 60 days

**Note that the host platform is 14+ miles away and thus drilling a relief well from a platform is not a possibility.*

Early Prevention of Blowouts

The key to preventing blowouts is early detection. The use of good oil field practices minimizes blow out risks. Keeping the BOPs in good working condition is essential. Monitoring the well during the drilling process is key to early detection. Watching for flow increases and or pit gains, checking for flow on connections, maintaining the MW correctly, utilizing a trip tank on all trips are all part of a successful strategy to catch kicks early. Properly handling a small kick is much easier than successfully circulating out a large kick. All rig personnel are trained in responding to well control events and are compliant with 30 CFR 250 Subpart O. The rig contractor crew, particularly the driller and the mud logging company, will be the first to see flow change. The driller will shut the well in at the first sign of a kick which keeps kick sizes small. The industry has experienced flow after cementing. Utilizing good cementing techniques, designing a cement slurry with additives that help to prevent flow after cementing, and following recommended cementing practices will provide prevention. This is an abnormal pressured well and Fieldwood will utilize good cementing techniques. Liner top packers will be run with the liners as they provide an additional barrier to possible leak paths.

(h) Contact Information

Description	Name	Email Address	Telephone Number
Primary	Ali Ferguson	ali.ferguson@fwellc.com	713-969-1308
Secondary	Brenda Montalvo	brenda.montalvo@fwellc.com	713-969-1084

Attachments

1) Table 1, "Waste Estimated to be Generated, Treated, and/or Downhole Disposed or Discharged to the GOM" (*Attachment A-1*)

				45.0 day	
Will drilling occur ? If yes, you should list muds and cuttings					
	Water, gel, NaCL, barite, caustic, FLC, polymers	24,000 bbls	2000 bbs/day for 13 days	Riserless Rtns to Mud Line	No
	Cuttings generated while using water base drilling fluids	3398 bbls	262 bbs/day for 13 days	Riserless Rtns to Mud Line	No
	IO based, emulsifi-ers,Wetting Agents,CaCL2, Freshwater,FLC, barite, calcium carbonate	210 bbls/per well	4.7 bbls/per day	Retained on cuttings - Dis-charge overboard below sea level	No
	Cuttings generated while using synthetic based drilling fluid.	2853 bbls/per well	63.4 bbls/per day	Discharge overboard below sea level	No
Will humans be there? If yes, expect conventional waste					
	Sink, Showers: Potable water	21060 bbls/per well	468 bbls/per day	Ground and discharge Over-board	No
	Sanitary waste from living quarters	Unable to determine	Combined Hydraulic Loading Rate of 3 onboard MSD Units is 6.91bbl/hr	Chlorinate and discharge overboard	No
Is there a deck? If yes, there will be Deck Drainage					
	Rain, Fresh Water,and Wash Detergent	1485 bbls/per well	33 bbls/per day	Discharged overboard	No
Will you conduct well treatment, completion, or workover?					
	NA	None	Sent into Fourchon for Disposal	NA	No
	(ZnBr 16.1 ppg)	7000 bbls	Sent into Fourchon for Disposal	NA	No
	Spacers	2,300 bbls	Sent into Fourchon for Disposal	NA	No
Miscellaneous discharges. If yes, only fill in those associated with your activity.					
	Salt Water/Brine	72900 bbls/per well	1620.0 bbls/per day	Discharged Overboard	
	3% Erifon, 97% Potable water	150 bbls. per well	1.7 bbls/per day	Through BOP Stack subsea and on deck during testing	No
	Sea Water	251640 bbls/per well	233 bbls/hour	Overboard through Ballast Water Treatment unit	
	Machinery space bilges / rainwater	33912 bbls/per well	31.4 bbl/hr rated capacity when OWS is in operation	Processed by OWS and dis-charged overboard through 15 ppm Oil Content Monitor	
	H-class cement slurry + additives	500-1000 bbls	Avg 500 bbls/ surface string (28" & 22")	Excess slurry flows out of wellhead outlets at seafloor	
	NA				
	Salt Water Cooling for Fresh Water Systems	3619080 bbls/per well	3351 bbls/hour		
Will you produce hydrocarbons? If yes fill in for produced water.					
	N/A				
Please enter *individual or general to indicate which type of NPDES permit you will be covered by?*					

SECTION B
GEOLOGICAL AND GEOPHYSICAL INFORMATION

(a) Geological Description

Proprietary Information

(b) Structure Contour Maps

Proprietary Information

(c) Two-Dimensional or Three-Dimensional Seismic Lines

Proprietary Information

(d) Geological Cross-Sections

Proprietary Information

(e) Shallow Hazards Report and (f) Shallow Hazards Assessment

An archaeological and geohazard assessment titled, "AUV/3D Seismic Shallow Hazard and Archaeological Report," was conducted over Green Canyon Block 200 in 2018 by Oceaneering International, Inc (OII). OII assigned the report Project Number 189363 and on May 5, 2018, BOEM assigned the referenced report Survey No. 24200.

Based on the findings of the aforementioned report, OII prepared Well Site Clearance Letters for each proposed well in this S-EP and the findings are included as a report under this section.

(g) High-Resolution Seismic Lines

Attached under this section is 3-D survey information including swath bathymetry/seafloor rendering/edge detection (fault scarp trends) overlain with the seafloor amplitude.

(h) Stratigraphic Column

Proprietary Information

(i) Time-Versus-Depth Chart

Proprietary Information

(j) Geochemical Information

Proprietary Information

(k) Future G&G Activities

Proprietary Information

Attachments:
1) Well Site Clearance Letters (*Attachment B-1*)
2) High Resolution Seismic Lines (*Attachment B-2*)

FIELDWOOD ENERGY

WELL SITE CLEARANCE LETTER

PROPOSED WELL TA10
BLOCK 200, GREEN CANYON AREA

OCEANEERING®

Oceaneering Document Number:	198253-OII-RPT-WCL-01	Survey Dates:	12-13 Feb, 2018
Client Document Number:	N/A	Location:	GC200
Client:	Fieldwood Energy, LLC	Vessel:	M/V *Ocean Project*

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	H. Pantlik	J. Cox	C. Baker	22Mar2019
0	Final Issue	H. Pantlik	C. Baker	C. Baker	17Apr2019

Signature Box

Harris Pantlik
Geoscientist

Attachment B-1
PUBLIC COPY

Fieldwood Energy, LLC
2000 W Sam Houston Parkway Suite 1200
Houston, TX 77042

ATTN: Mr. Eric Kubera

Well Site Clearance Letter
Proposed Well TA10
Block 200 (OCS-G-12209), Green Canyon Area

INTRODUCTION

Fieldwood Energy, LLC (Fieldwood) contracted Oceaneering International, Inc. (OII) to prepare a well site clearance letter for the proposed drilling location of Well TA10 in Block 200 (OCS-G-12209), Green Canyon Area (GC). The data used for the well site clearance letter is based on the interpretation of high-resolution Autonomous Underwater Vehicle (AUV) data collected by OII and an exploration-quality 3D seismic volume licensed by Fieldwood. OII completed an archaeological and geohazard assessment titled "*AUV/3D Seismic Shallow Hazard and Archaeological Report, Block 200 (OCS-G-12209), Green Canyon Area, Gulf of Mexico*". This assessment was submitted to Fieldwood in March 2018, and this well site clearance letter is based on the findings provided within that report.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius of the proposed Well TA10 surface location. The depth limit of the investigation is approximately 5,200 feet below the seafloor (BSF). This assessment and enclosures presented with this letter comply with the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Notice To Lessees (NTL) No. 2008-G05 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeology), and NTL No. 2009-G40 (Deepwater Benthic Communities).

WELL LOCATION

The coordinates and calls for the proposed Well TA10 surface location are tabulated below:

Table 1. Proposed Well TA10 Surface Location

Well	Easting (feet)	Northing (feet)	Latitude	Longitude	Calls From GC200	
TA10	2,370,122.00'	10,081,983.0'	27° 45' 52.483" N	90° 44' 35.411" W	5,878.00' FEL	7,743.00' FSL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93° 00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00° 00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 5). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed Well TA10 surface location and the 2,000-foot radius circle centered at the surface location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Hazard Map (Sheet 5).

SURVEY METHODS

AUV Survey Data

The high-resolution AUV data were collected using OII's *O-Surveyor III* AUV on February 12 and 13, 2018. The AUV remote-sensing instruments include a Simrad EM 2040 Multibeam Echosounder (200 kHz), EdgeTech 2200-M Full Spectrum Chirp Side Scan Sonar (120/410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5 – 10.0 kHz). In general, the AUV survey grid pattern consisted of parallel east-west primary tracklines and parallel north-south tie lines. The primary trackline spacing was 200 meters (656.17 feet), and the tie lines were spaced at 900 meters (2,952.75 feet).

3D Seismic Data

Fieldwood provided an exploration-quality 3D seismic data volume in SEG-Y format. Inlines and crosslines are depicted on the Hazards Map (Sheet 5). The 3D data were provided at a 2-millisecond sample rate and extend to the full depth of the study. The 3D seismic data is a zero phase wavelet and the seafloor reflector is represented by a strong positive amplitude peak flanked by troughs with absolute amplitude values of approximately one-half of the peak value. The 3D seismic data are in the depth domain and the computed spectrum is provided in Figure 1. The inlines of the data run southwest to northeast and are spaced at 30-meter (98.42-foot) intervals. The crosslines run southeast to northwest and are spaced at 25-meter (82.02-foot) intervals.

BATHYMETRY AND SEAFLOOR GRADIENTS

Bathymetry was processed using the AUV multibeam and is shown on the Color Shaded Bathymetry Map (Sheet 1) at 10-foot contour intervals. The bathymetry indicates the water depth at the proposed Well TA10 location is 2,525 feet Mean Seal Level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 2,475 feet MSL in the west-northwest to 2,589 feet MSL in the southeast (Sheet 1). At the proposed well, the seafloor is smooth and slopes to the southeast at an average gradient of 1.5°. Small seafloor irregularities in the area are observed as seafloor gullies and fault scarps. Within the 2,000-foot radius, the highest localized seafloor gradient measures 9° and occurs along a west-southwest to east-northeast trending fault scarp 1,750 feet east-northeast of the proposed well (Sheet 2).

SEAFLOOR SEDIMENTS AND HAZARDS

The side scan sonar images (Sheet 3; Figure 2) exhibit primarily low to moderate acoustic reflectivity. Additionally, the 3D seafloor amplitude image (Sheet 4) displays a range of low to moderate acoustic amplitudes within the 2,000-foot radius and agrees well with the side scan sonar images. These low to moderate acoustic reflectivity and seafloor amplitudes indicate finely textured seafloor sediments likely comprised of hemipelagic clay (very soft silty clay).

One surface fault is located within the 2,000-foot radius. This fault is located 1,750 feet west-northwest of the proposed well, striking west-southwest to east-northeast, and dips to the northwest, and offsets the seabed by 3 feet.

The side scan sonar and multibeam images show numerous gullies and pockmarks on the seafloor (Sheet 5). The gullies exhibit widths between 30 and 120 feet and negative relief of up to 3 feet below the ambient seafloor. Localized seafloor gradients across these gullies range from 2° to 4° (Sheet 2). The subbottom profiler images suggest these gullies have occupied the same position for several thousand years (Figure 3). The subbottom profiler records do not show any lenses of sediment being deposited or transported in the gullies. Bottom currents may aid in transporting sediment along the gullies and presumed to be on the order of magnitude of a turbidity flow or current. The low sediment density of these types of flows should have no impact on drilling or development activities.

The depressions are potentially created by the vertical migration of fluids through fractures in unconsolidated to semi-consolidated sediments. Slower migration of fluids and gas are less capable of entraining large amounts of sediments and often result in the development of small seafloor features such as pockmarks. The subbottom profile records do not show any shallow gas accumulations associated with the pockmarks suggesting they are due to dewatering. The depressions average 6 feet in diameter and are less than one foot in depth. Drag scars also occur throughout the study area and are attributable to lease developments activities.

POTENTIAL DEEPWATER BENTHIC COMMUNITIES

High-amplitude seismic seafloor anomalies are a potential indicator of carbonates and benthic community habitats. The seafloor at the proposed Well TA10 location and surrounding 2,000-foot radius contains no highly negative or positive amplitude anomalies associated with fluid expulsion or mounded carbonates representing potential benthic communities (Sheets 4 and 5). Additionally, the side scan sonar images and subbottom profiles show no evidence of hydrocarbon seepage within 2,000 feet of the proposed Well TA10 surface location (Sheet 5; Figures 2 and 3). Impact to potential deepwater benthic communities for the proposed Well TA10 is considered negligible.

MAN-MADE HAZARDS

A review of OII and the BOEM/BSEE databases shows 2 flowlines and 3 umbilicals located within the 2,000-foot radius. The closest flowline is located 610 feet northeast from the proposed Well TA10 surface location.

There are no unidentified sonar contacts within the 2,000-foot radius. The locations, lengths, widths, and heights of the unidentified sonar contacts outside the 2,000 foot radius can be found on the Side Scan Sonar Mosaic Map (Sheet 3) and Hazards Map (Sheet 5). None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

Within the study area, the AUV subbottom profiles provide high-resolution stratigraphy to a maximum depth of approximately 300 feet BSF. The subbottom profiler data exhibit continuous, sharp bottom echoes with parallel and continuous reflectors throughout the area. In general, these sediment deposits are characterized by interleaved low to moderate amplitude reflectors that represent cyclic deposition of hemipelagic clay and fine-grained turbidites. One buried fault extending from a surficial fault is observed within the proposed Well TA10 2,000-foot radius. The buried fault is observed 3,228 to 4,562 feet BSF and striking southwest to northeast. The proposed well bore path does not cross this fault plane as the fault is dipping to the northwest (Figures 3 – 6).

Within the study area, 6 sedimentary units (Units A – F), each consisting of one or more distinctive sequences, were interpreted from the AUV and 3D seismic data to approximately 5,200 feet BSF, the lower limit of investigation. The seafloor and 6 horizons mark the top and/or base of each of the successive units (Figures 4).

Unit A (Seafloor to Horizon 1)

Unit A consists mostly of low amplitude, parallel, continuous reflectors and is 409 feet thick at the well location. Unit A occurs 2,525 – 2,934 feet BSL at the well location. Amplitudes and acoustic impedance contrasts are low and suggest the unit is comprised of mostly hemipelagic clay laid down as a drape deposit with some mass transport deposits near the base of the unit. No amplitude anomalies occur within Unit A.

Unit B (Horizon 1 to Horizon 2)
Unit B occurs from 2,934 – 3,101 feet BSL (409 – 576 feet BSF) at the proposed well location and consists of low amplitude, subparallel reflectors. The sediments in Unit B are interpreted as likely comprised of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit B.

Unit C (Horizon 2 to Horizon 3)
Unit C consists of variable amplitude, semi-continuous reflectors and occurs from 3,101 – 3,500 feet BSL (576 – 975 feet BSF). The unit is interpreted as hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit C.

Unit D (Horizon 3 to Horizon 4)
Unit D is comprised of subparallel to chaotic, variable amplitude reflectors and occurs from 3,500 – 4,626 feet BSL (975 – 3,496 feet BSF). The upper portion of Unit D is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit D is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit D in the 2,000 foot radius of the proposed well.

Unit E (Horizon 4 to Horizon 5)
Unit E consists of subparallel to chaotic, low to medium amplitude reflectors and occurs from 4,626 – 6,456 feet BSL (2,201 – 3,931 feet BSF). The sediments within the upper portion of Unit E are interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. The middle portion of Unit E is channel fills with sandy interbeds. The lower portion of Unit E is interpreted as draped deposits that are interbedded with fine-grained turbidites, mass movement deposits, and channel fills with sandy interbeds. No amplitude anomalies occur within Unit E.

Unit F (Horizon 5 to Horizon 6)
Unit F occurs from 6,456 – 7,712 BSL (3,931 – 5,187 feet BSF) and consists of variable amplitude, subparallel to chaotic reflectors. The upper portion of Unit F is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit F is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit F.

SHALLOW GAS

Anomalies of very high amplitude are interpreted as potential regions of fluid/gas saturation usually associated with porous sands. The risk of shallow gas is interpreted based on seismic amplitude levels with geologic settings taken into account. The gas risk is assessed as being at one of the following levels:

- **Negligible:** No amplitude anomalies or other gas indicators present.
- **Low risk of gas:** Generally indicated by increased amplitude (2 – 3 times background level) and phase reversal. This may also include diffuse areas of gas blanking.
- **Moderate risk of gas:** Generally indicated by high amplitude (3 – 4 times background level) and phase reversal.
- **High risk of gas:** Generally indicated by the highest amplitudes (in excess of 4 times background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be taken into account.

Units A – C exhibit a negligible risk of gas. Units D – F all exhibit a low risk of shallow gas. The well bore path does not penetrate any high-amplitude anomalies (Figures 3 – 6).

SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a seal that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles. Several factors may contribute to SWF, including high porosity and permeability, sand-prone aquifer, mechanism to pressurize, and seal. Additional details are described below:

- **Water depth and depth of burial:** Significant water depths (> 500 feet below sea level) are required for the overpressure to occur. The seal must be deeply buried (> 500 feet below the seafloor) to become sufficiently strong.
- **High deposition rates:** Sedimentation rate needs to be greater than 1,500 feet/myr to effectively seal in sands. Sedimentation rates are expected to be high within a salt withdrawal basin. Rapid burial leads to pressure disequilibrium. In addition, if these sediment 'packets' were formed through a sequence of turbidites or gravity flow, there is an increased likelihood of water saturation and overpressure (pore pressure rapidly increased and sealed by an impervious layer).
- **Suitably porous sediments:** The sediment packets comprising the risk of shallow water flow are believed to contain clastic material and are thus porous.
- **Impermeable seal:** The overlying sediments are comprised of a clay facies.

All of these factors occur within the study area. Since there is presently no method for quantifying the risk of SWF, caution is recommended when drilling through units with shallow water flow potential. Sands with SWF potential often occur in unconsolidated, overpressured sands that lie below a seal. This seal prevents dewatering and compaction after deposition. The pressure rises with overburden causing a potentially disastrous hazard for drilling operations.

Nine wells currently exist within GC200. According to information listed on the BOEM and BSEE website, 2 of these 9 wells experienced a SWF event reported at 1,266 feet BSF (TA-5 and Well No. 1 (OCS-G-12209)), correlating with Unit D in this assessment. Both SWF events were categorized as low severity flows and well integrity was maintained.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of coarse-grained channel fills below low amplitude potential seals, SWF is considered low to moderate in Unit C – E. Due to the unpredictable nature of SWF, it is advised that caution be executed for any drilling operations through these sediments.

GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross cut the normal seismic stratigraphy, much like a bottom multiple.

The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates, and benthic communities may all be found in close association. There was no indication of gas hydrates, associated geologic feature, or BSRs near the proposed well.

CONCLUSIONS

The proposed Well TA10 surface location has a water depth of 2,525 feet MSL. The seafloor at the proposed well slopes southeast at a gradient of 1.5°.

Geologic features within the 2,000-foot radius include: seafloor fault scarps, gullies, depressions, and drag scars.

No high acoustic reflectivity (side scan sonar) or seafloor amplitude anomalies (3D seismic) indicating the occurrence of hardgrounds, carbonates, benthic communities, or potential expulsions, are found within 2,000 feet of the proposed Well TA10 location.

No unidentified sonar contacts are noted within 2,000-foot radius of the proposed Well TA10. None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

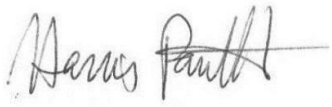
Three flowlines and two umbilicals are observed 2,000 feet of the proposed Well TA10 surface location. The closest flowline (S-20057 Deepwater Abandonment Alternative, Inc. 4" Umbilical) is located 410 feet northeast of the proposed Well TA10.

The assessment of seismic profiles suggests stratigraphic units at the proposed Well TA10 drill site exhibit a negligible risk of gas in Units A – C, and a low risk of gas in Units D – F.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Units C – E.

Thank you for this opportunity to be of service. Please contact us if you have any questions concerning this assessment.

Sincerely,



Harris Pantlik
Geoscientist

ENCLOSURES

Figure 1. Computed frequency at the proposed Well TA10 location.
Figure 2. Side scan sonar image (Line 114) showing the proposed Well TA10 location.
Figure 3. Subbottom profile record (Line 113) showing the proposed Well TA10 location.
Figure 4. 3D seismic Inline (4403) showing the proposed Well TA10 location.
Figure 5. 3D seismic Crossline (10127) showing the proposed Well TA10 location.
Figure 6. Top-Hole Prognosis Chart for the proposed Well TA10 location.

Sheet 1. Color Shaded Bathymetry Map
Sheet 2. Seafloor Gradient Map
Sheet 3. Side Scan Sonar Mosaic Map
Sheet 4. Seafloor Amplitude Map
Sheet 5. Hazards Map

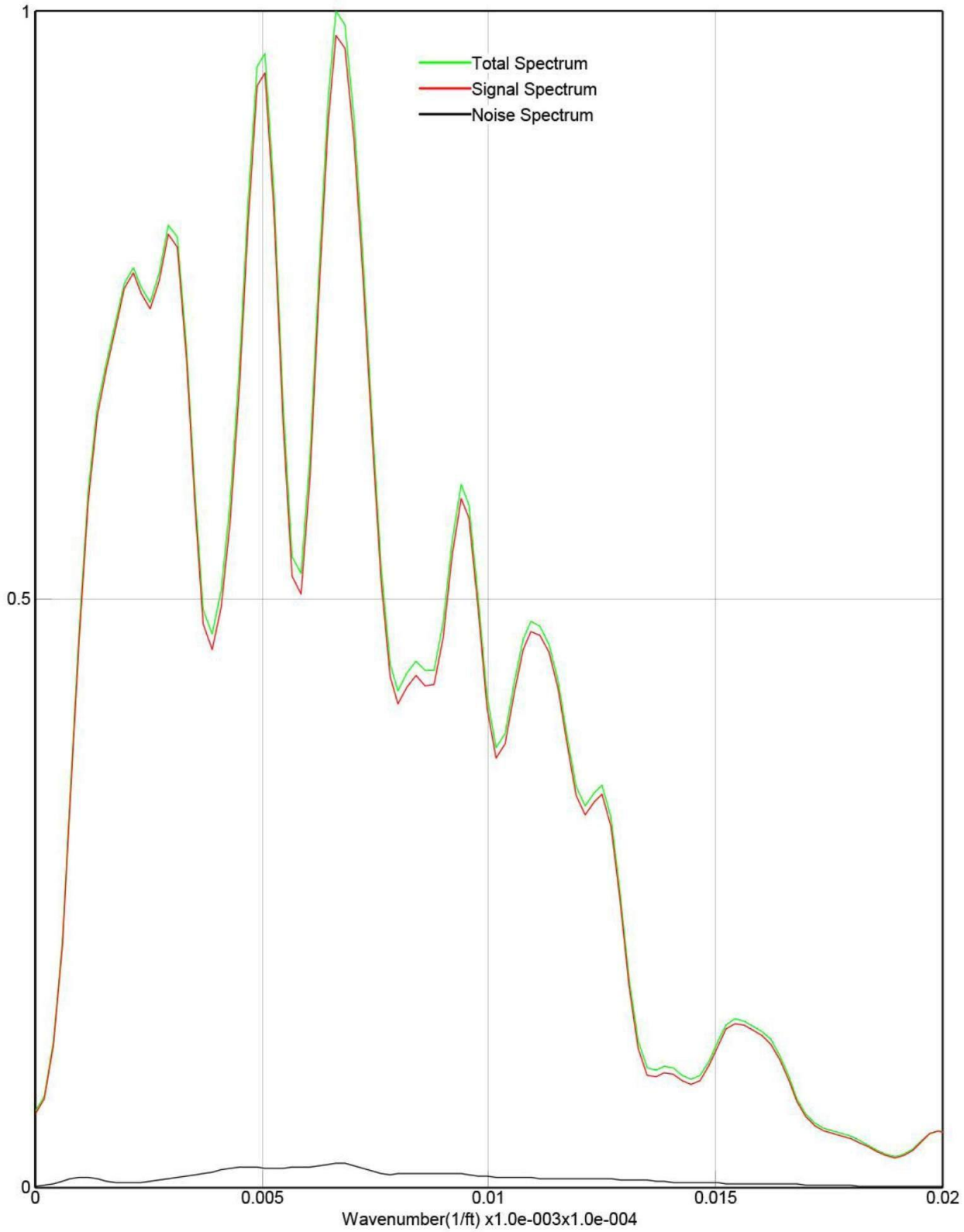
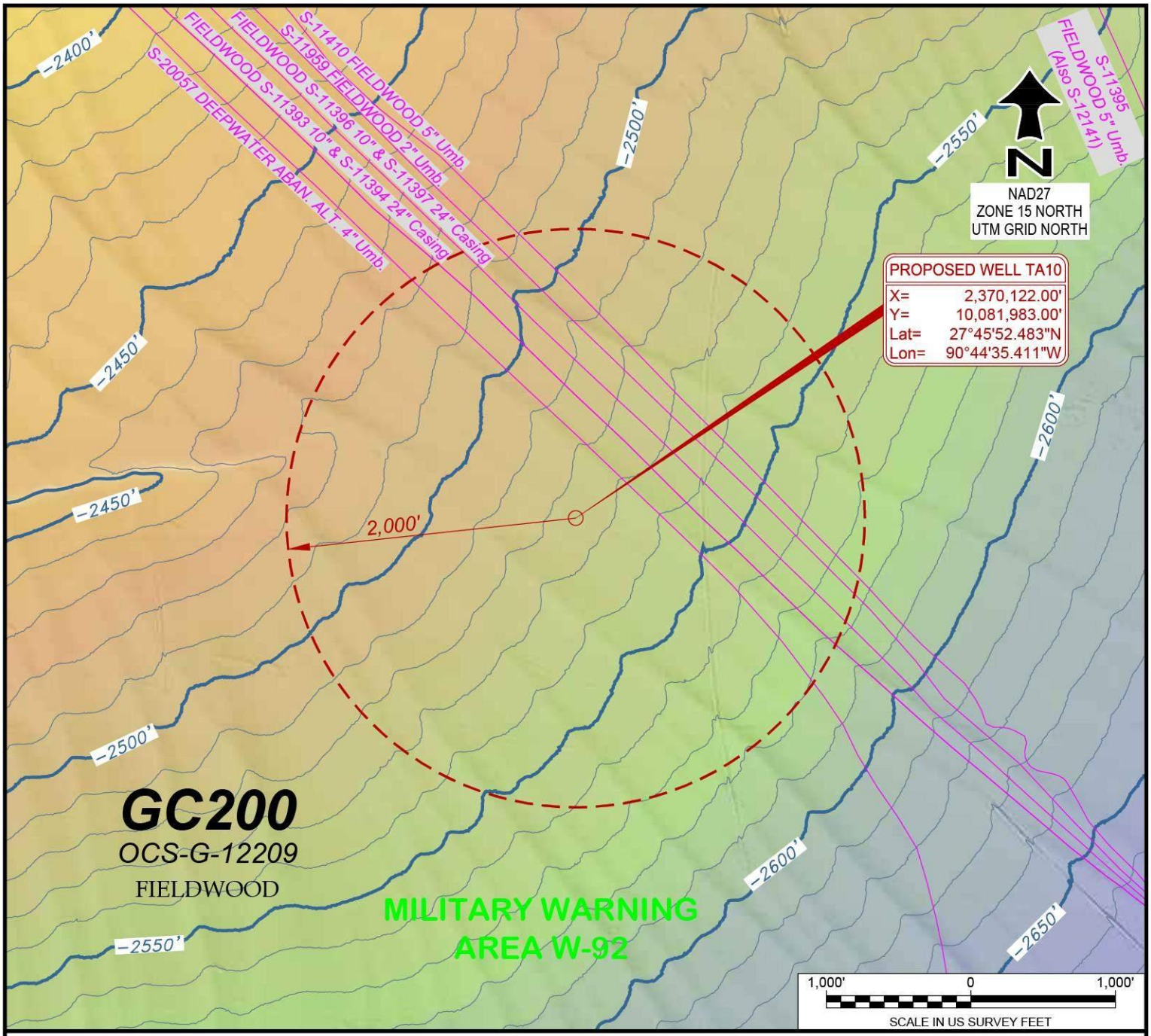


Figure 1. Computed frequency at the proposed Well TA10 location.



Multibeam Processing Sequence

- Water column velocity and density corrections applied
- Tide corrections applied using Goddard Ocean Tide Model GOT99.2
- Bin size = 3 meters (9.84 feet)
- Median filter applied
- Produced gridded-binned dataset using weighted-neighbor algorithm
- Search radius = 9 meters (29.53 feet)
- Contour interval = 10 feet
- Zero datum = Mean Sea Level

Color shaded image

Sun azimuth = 45°
Sun elevation = 30°

Shallower — Deeper

FIELDWOOD ENERGY

PROPOSED WELL TA10

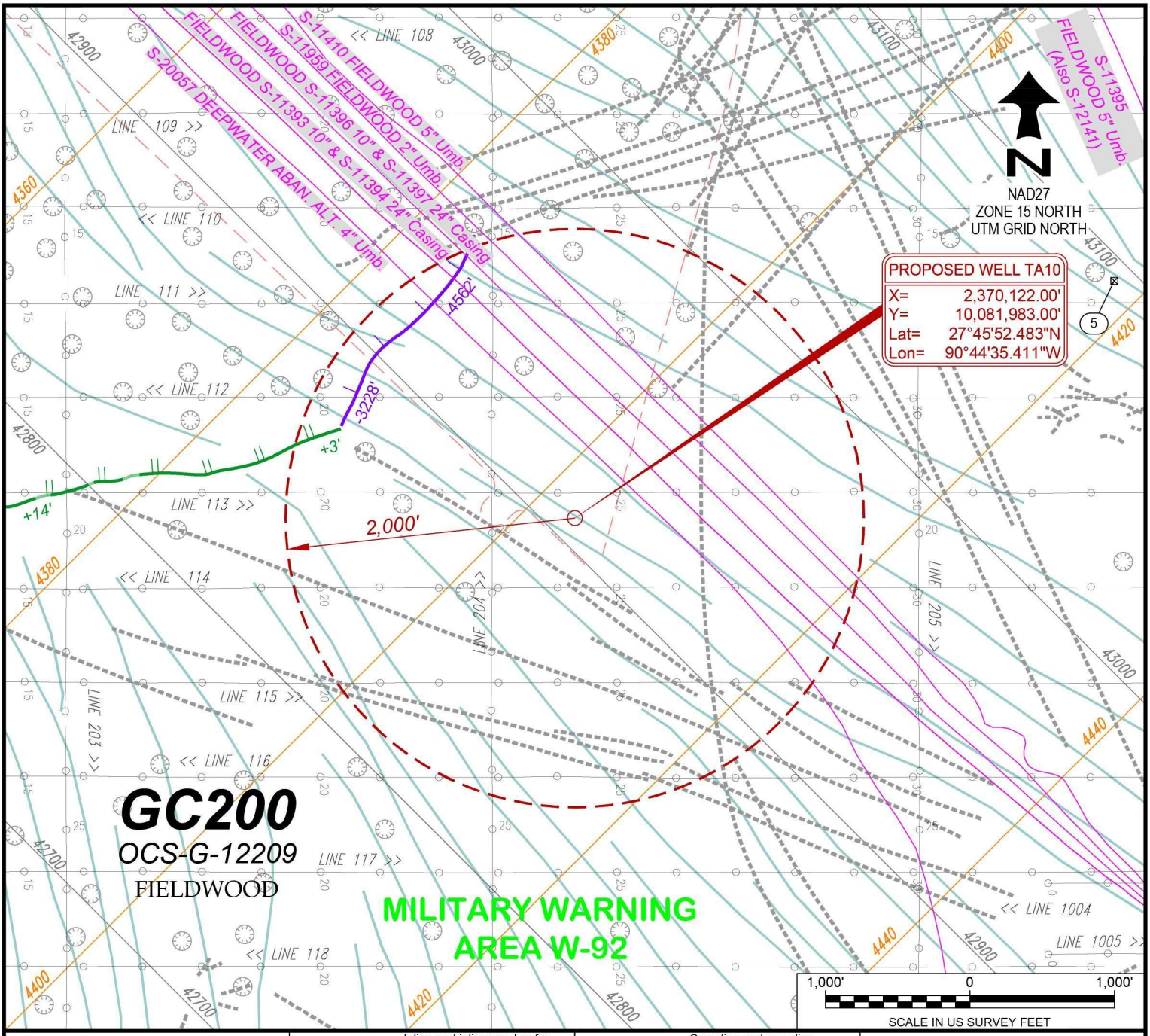
COLOR SHADED BATHYMETRY MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 16, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 1 of 5
DOC: 198253-OII-DRW-CLR-001-01		REV. 0



Navigation trackline with name, direction run, fix, and fix number	Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)	Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4	Sonar contact & reference number
Surface fault with scarp height and seafloor displacement in feet (Hachures on downthrown side)	Drag scar	Depression (symbol does not reflect actual size)	Gully
Normal fault with depth of burial (Hachures on downthrown side)			

NOTE: 3D seismic data provided in depth from client.

SONAR CONTACT

NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
5	482.4'x12.7'x0.0'	2,373,855'	10,083,624'

FIELDWOOD ENERGY

PROPOSED WELL TA10

HAZARDS MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 16, 2019	
CKD: D. Pierrottie	APP: C. Baker	SHEET 5 of 5	REV. 0
DOC: 198253-OII-DRW-CLR-001-05			

WELL SITE CLEARANCE LETTER

PROPOSED WELL TA12
BLOCK 200, GREEN CANYON AREA

Oceaneering Document Number:	198253-OII-RPT-WCL-02	Survey Dates:	12-13 Feb, 2018
Client Document Number:	N/A	Location:	GC200
Client:	Fieldwood Energy, LLC	Vessel:	M/V *Ocean Project*

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	H. Pantlik	J. Cox	C. Baker	21Mar2019
0	Final Issue	H. Pantlik	C. Baker	C. Baker	17Apr2019

Signature Box

Harris Pantlik
Geoscientist

Fieldwood Energy, LLC
2000 W Sam Houston Pkwy S Suite 1200
Houston, TX 77042

ATTN: Mr. Eric Kubera

Well Site Clearance Letter
Proposed Well TA12
Block 200 (OCS-G-12209), Green Canyon Area

INTRODUCTION

Fieldwood Energy, LLC (Fieldwood) contracted Oceaneering International, Inc. (OII) to prepare a well site clearance letter for the proposed drilling location of Well TA12 in Block 200 (OCS-G-12209), Green Canyon Area (GC). The data used for the well site clearance letter is based on the interpretation of high-resolution Autonomous Underwater Vehicle (AUV) data collected by OII and an exploration-quality 3D seismic volume licensed by Fieldwood. OII completed an archaeological and geohazard assessment titled "*AUV/3D Seismic Shallow Hazard and Archaeological Report, Block 200 (OCS-G-12209), Green Canyon Area, Gulf of Mexico*". This assessment was submitted to Fieldwood in March 2018, and this well site clearance letter is based on the findings provided within that report.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius of the proposed Well TA12 surface location. The depth limit of the investigation is approximately 5,200 feet below the seafloor (BSF). This assessment and enclosures presented with this letter comply with the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Notice To Lessees (NTL) No. 2008-G05 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeology), and NTL No. 2009-G40 (Deepwater Benthic Communities).

WELL LOCATION

The coordinates and calls for the proposed Well TA12 surface location are tabulated below:

Table 1. Proposed Well TA12 Surface Location

Well	Easting (feet)	Northing (feet)	Latitude	Longitude	Calls From GC200	
TA12	2,367,331.93'	10,087,844.28'	27° 46' 51.007" N	90° 45' 05.263" W	7,171.95' FWL	2,235.72' FNL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93° 00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00° 00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 5). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed Well TA12 surface location and the 2,000-foot radius circle centered at the surface location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Hazard Map (Sheet 5).

SURVEY METHODS

AUV Survey Data

The high-resolution AUV data were collected using OII's *O-Surveyor III* AUV on February 12 and 13, 2018. The AUV remote-sensing instruments include a Simrad EM 2040 Multibeam Echosounder (200 kHz), EdgeTech 2200-M Full Spectrum Chirp Side Scan Sonar (120/410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5 – 10.0 kHz). In general, the AUV survey grid pattern consisted of parallel east-west primary tracklines and parallel north-south tie lines. The primary trackline spacing was 200 meters (656.17 feet), and the tie lines were spaced at 900 meters (2,952.75 feet).

3D Seismic Data

Fieldwood provided an exploration-quality 3D seismic data volume in SEG-Y format. Inlines and crosslines are depicted on the Hazards Map (Sheet 5). The 3D data were provided at a 2-millisecond sample rate and extend to the full depth of the study. The 3D seismic data is a zero phase wavelet and the seafloor reflector is represented by a strong positive amplitude peak flanked by troughs with absolute amplitude values of approximately one-half of the peak value. The 3D seismic data are in the depth domain and the computed spectrum is provided in Figure 1. The inlines of the data run southwest to northeast and are spaced at 30-meter (98.42-foot) intervals. The crosslines run southeast to northwest and are spaced at 25-meter (82.02-foot) intervals.

BATHYMETRY AND SEAFLOOR GRADIENTS

Bathymetry was processed using the AUV multibeam and is shown on the Color Shaded Bathymetry Map (Sheet 1) at 10-foot contour intervals. The bathymetry indicates the water depth at the proposed Well TA10 location is 2,361 feet Mean Seal Level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 2,291 feet MSL in the northwest to 2,427 feet MSL in the southeast (Sheet 1). At the proposed well, the bathymetry indicates the seafloor is smooth and slopes to the southeast at an average gradient of 1.6°. Small seafloor irregularities in the area are observed as seafloor gullies. Within the 2,000-foot radius, the highest localized seafloor gradient measures 6° and occurs along a drag scar located 210 feet south of the proposed well (Sheets 2 and 5).

SEAFLOOR SEDIMENTS AND HAZARDS

The side scan sonar images (Sheet 3; Figure 2) exhibit primarily low to moderate acoustic reflectivity. Additionally, the 3D seafloor amplitude image (Sheet 4) displays a range of low to moderate acoustic amplitudes within the 2,000-foot radius and agrees well with the side scan sonar images. These low to moderate acoustic reflectivity and seafloor amplitudes indicate finely textured seafloor sediments likely comprised of hemipelagic clay (very soft silty clay).

The side scan sonar and multibeam images show numerous gullies and depressions on the seafloor (Sheet 5). The gullies exhibit widths between 30 and 120 feet and negative relief of up to 3 feet below the ambient seafloor. Localized seafloor gradients across these gullies range from 2° – 4° (Sheet 4). The subbottom profiler images suggest these gullies have occupied the same position for several thousand years (Figure 3). The subbottom profiler records do not show any lenses of sediment being deposited or transported in the gullies. Bottom currents may aid in transporting sediment along the gullies and presumed to be on the order of magnitude of a turbidity flow or current. The low sediment density of these types of flows should have no impact on drilling or development activities.

The depressions are potentially created by the vertical migration of fluids through fractures in unconsolidated to semi-consolidated sediments. Slower migration of fluids and gas are less capable of entraining large amounts of sediments and often result in the development of small seafloor features

such as depressions. The subbottom profile records do not show any shallow gas accumulations associated with the depressions suggesting they are due to dewatering. The depressions average 6 feet in diameter and are less than one foot in depth. Drag scars also occur throughout the study area and are attributable to lease developments activities.

POTENTIAL DEEPWATER BENTHIC COMMUNITIES

High-amplitude seismic seafloor anomalies are a potential indicator of carbonates and benthic community habitats. The seafloor at the proposed Well TA12 location and surrounding 2,000-foot radius contains no highly negative or positive amplitude anomalies associated with fluid expulsion or mounded carbonates representing potential benthic communities (Sheets 4 and 5). Additionally, the side scan sonar images and subbottom profiles show no evidence of hydrocarbon seepage within 2,000 feet of the proposed Well TA12 surface location (Sheet 5; Figures 2 and 3). Impact to potential deepwater benthic communities for the proposed Well TA12 is considered negligible.

MAN-MADE HAZARDS

A review of OII and the BOEM/BSEE databases shows 2 flowlines and 3 umbilicals located within the 2,000-foot radius. The closest flowline is located 610 feet southwest from the proposed Well TA12 surface location.

There are no unidentified sonar contacts within the 2,000-foot radius. The locations, lengths, widths, and heights of the unidentified sonar contacts outside the 2,000 foot radius can be found on the Side Scan Sonar Mosaic Map (Sheet 3) and Hazards Map (Sheet 5). None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

Within the study area, the AUV subbottom profiles provide high-resolution stratigraphy to a maximum depth of approximately 300 feet BSF. The subbottom profiler data exhibit continuous, sharp bottom echoes with parallel and continuous reflectors throughout the area. In general, these sediment deposits are characterized by interleaved low to moderate amplitude reflectors that represent cyclic deposition of hemipelagic clay and fine-grained turbidites.

Within the study area, 6 sedimentary units (Units A – F), each consisting of one or more distinctive sequences, were interpreted from the AUV and 3D seismic data to approximately 5,200 feet BSF, the lower limit of investigation. The seafloor and 6 horizons mark the top and/or base of each of the successive units (Figures 4).

Unit A (Seafloor to Horizon 1)

Unit A consists mostly of low amplitude, parallel, continuous reflectors and is 449 feet thick at the well location. Unit A occurs 2,361 – 2,810 feet BSL at the well location. Amplitudes and acoustic impedance contrasts are low and suggest the unit is comprised of mostly hemipelagic clay laid down as a drape deposit with some mass transport deposits near the base of the unit. No amplitude anomalies occur within Unit A.

Unit B (Horizon 1 to Horizon 2)

Unit B occurs from 2,810 – 2,991 feet BSL (449 – 630 feet BSF) at the proposed well location and consists of low amplitude, subparallel reflectors. The sediments in Unit B are interpreted as likely comprised of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit B.

Unit C (Horizon 2 to Horizon 3)
Unit C consists of variable amplitude, semi-continuous reflectors and occurs from 2,991 – 3,310 feet BSL (630– 949 feet BSF). The unit is interpreted as hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit C.

Unit D (Horizon 3 to Horizon 4)
Unit D is comprised of subparallel to chaotic, variable amplitude reflectors and occurs from 3,310 – 4,492 feet BSL (949– 2,131 feet BSF). The upper portion of Unit D is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit D is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit D in the 2,000 foot radius of the proposed well.

Unit E (Horizon 4 to Horizon 5)
Unit E consists of subparallel to chaotic, low to medium amplitude reflectors and occurs from 4,492 – 6,405 feet BSL (2,131 – 4,044 feet BSF). The sediments within the upper portion of Unit E are interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. The middle portion of Unit E is channel fills with sandy interbeds. The lower portion of Unit E is interpreted as draped deposits that are interbedded with fine-grained turbidites, mass movement deposits, and channel fills with sandy interbeds. One amplitude anomaly is located 1,456 feet west-southwest of the proposed well.

Unit F (Horizon 5 to Horizon 6)
Unit F occurs from 6,405 – 7,567 BSL (4,044 – 5,206 feet BSF) and consists of variable amplitude, subparallel to chaotic reflectors. The upper portion of Unit F is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit F is interpreted as sediments of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit F.

SHALLOW GAS

Anomalies of very high amplitude are interpreted as potential regions of fluid/gas saturation usually associated with porous sands. The risk of shallow gas is interpreted based on seismic amplitude levels with geologic settings taken into account. The gas risk is assessed as being at one of the following levels:

- **Negligible:** No amplitude anomalies or other gas indicators present.
- **Low risk of gas:** Generally indicated by increased amplitude (2 – 3 times background level) and phase reversal. This may also include diffuse areas of gas blanking.
- **Moderate risk of gas:** Generally indicated by high amplitude (3 – 4 times background level) and phase reversal.
- **High risk of gas:** Generally indicated by the highest amplitudes (in excess of 4 times background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be taken into account.

Units A – C exhibit a negligible risk of gas. Units D – F all exhibit a low risk of shallow gas. The well bore path does not penetrate a high-amplitude anomaly (Figures 3 – 6).

SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a seal that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles. Several factors may contribute to SWF, including high porosity and permeability, sand-prone aquifer, mechanism to pressurize, and seal. Additional details are described below:

- **Water depth and depth of burial:** Significant water depths (> 500 feet below sea level) are required for the overpressure to occur. The seal must be deeply buried (> 500 feet below the seafloor) to become sufficiently strong.
- **High deposition rates:** Sedimentation rate needs to be greater than 1,500 feet/myr to effectively seal in sands. Sedimentation rates are expected to be high within a salt withdrawal basin. Rapid burial leads to pressure disequilibrium. In addition, if these sediment 'packets' were formed through a sequence of turbidites or gravity flow, there is an increased likelihood of water saturation and overpressure (pore pressure rapidly increased and sealed by an impervious layer).
- **Suitably porous sediments:** The sediment packets comprising the risk of SWF are believed to contain clastic material and are thus porous.
- **Impermeable seal:** The overlying sediments are comprised of a clay facies.

All of these factors occur within the study area. Since there is presently no method for quantifying the risk of SWF, caution is recommended when drilling through units with shallow water flow potential. Sands with SWF potential often occur in unconsolidated, overpressured sands that lie below a seal. This seal prevents dewatering and compaction after deposition. The pressure rises with overburden causing a potentially disastrous hazard for drilling operations.

Nine wells currently exist within GC200. According to information listed on the BOEM and BSEE website, 2 of these 9 wells experienced a SWF event reported at 1,266 feet BSF (TA-5 and Well No. 1 (OCS-G-12209)), correlating with Unit D in this assessment. Both SWF events were categorized as low severity flows and well integrity was maintained.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of coarse-grained channel fills below low amplitude potential seals, SWF is considered low to moderate in Unit C – E. Due to the unpredictable nature of SWF, it is advised that caution be executed for any drilling operations through these sediments.

GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross cut the normal seismic stratigraphy, much like a bottom multiple.

The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates, and benthic communities may all be found in close association. There was no indication of gas hydrates, associated geologic feature, or any BSRs near the proposed well.

CONCLUSIONS

The proposed Well TA12 surface location has a water depth of 2,361 feet MSL. The seafloor at the proposed well slopes southeast at a gradient of 1.6°.

Geologic features observed in the 2,000-foot radius include seafloor gullies, depressions, and drag scars.

No high acoustic reflectivity (side scan sonar) or seafloor amplitude anomalies (3D seismic) indicating the occurrence of hardgrounds, carbonates, benthic communities, or potential expulsions, are found within 2,000 feet of the proposed Well TA12 location.

No unidentified sonar contacts are noted within the 2,000-foot radius of the proposed Well TA12. None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

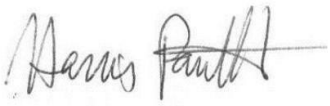
Two flowlines and 3 umbilicals occur 2,000 feet of the proposed Well TA12 surface location. The closest umbilical (S-11410 Fieldwood 5") is located 1,087 feet southwest of the proposed Well TA12.

The assessment of seismic profiles suggests stratigraphic units at the proposed Well TA12 drill site exhibit a negligible risk of gas in Units A – C, and a low risk of gas in Units D – F.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Unit C – E.

Thank you for this opportunity to be of service. Please contact us if you have any questions concerning this assessment.

Sincerely,



Harris Pantlik
Geoscientist

ENCLOSURES

Figure 1. Frequency content and extracted wavelet at the proposed Well TA12 location.
Figure 2. Side scan sonar image (Line 114) showing the proposed Well TA12 location.
Figure 3. Subbottom profile record (Line 114) showing the proposed Well TA12 location.
Figure 4. 3D seismic Inline (4406) showing the proposed Well TA12 location.
Figure 5. 3D seismic Crossline (42904) showing the proposed Well TA12 location.
Figure 6. Top-Hole Prognosis Chart for the proposed Well TA12 location.

Sheet 1. Color Shaded Bathymetry Map
Sheet 2. Seafloor Gradient Map
Sheet 3. Side Scan Sonar Mosaic Map
Sheet 4. Seafloor Amplitude Map
Sheet 5. Hazards Map

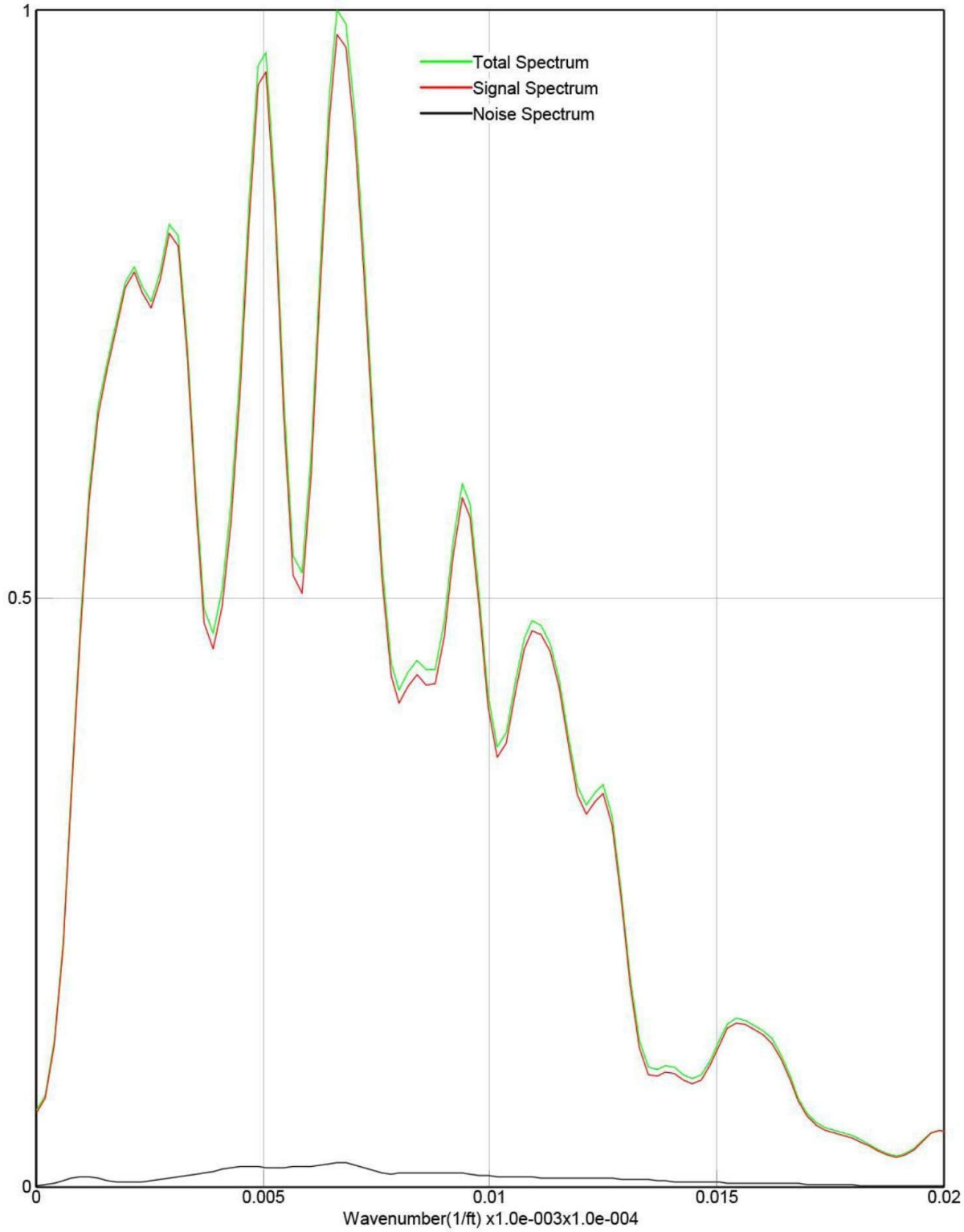
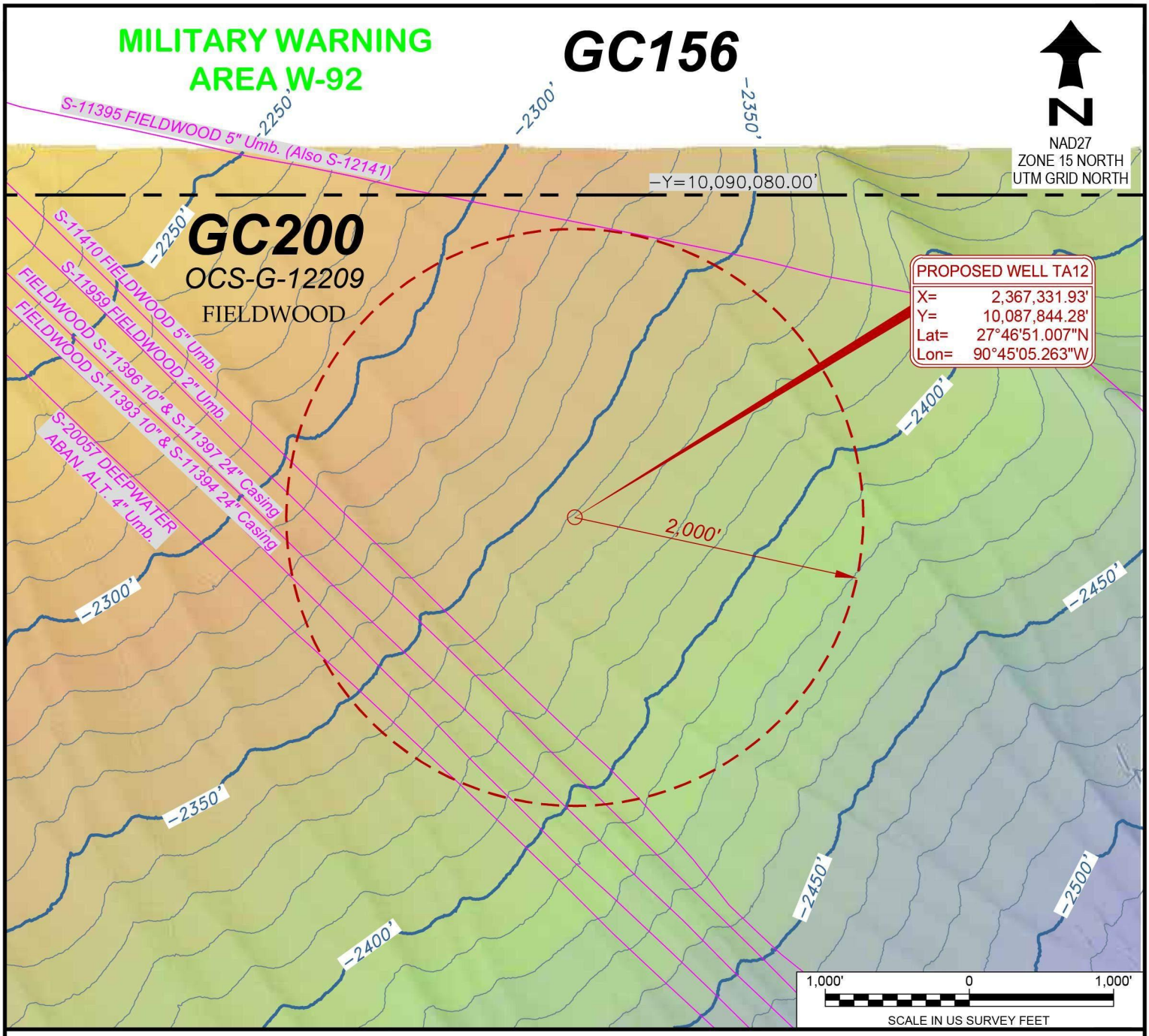


Figure 1. Frequency content at the proposed Well TA12 location.



Multibeam Processing Sequence

- Water column velocity and density corrections applied
- Tide corrections applied using Goddard Ocean Tide Model GOT99.2
- Bin size = 3 meters (9.84 feet)
- Median filter applied
- Produced gridded-binned dataset using weighted-neighbor algorithm
- Search radius = 9 meters (29.53 feet)
- Contour interval = 10 feet
- Zero datum = Mean Sea Level

Color shaded image

Sun azimuth = 45°
Sun elevation = 30°

Shallower — Deeper

FIELDWOOD ENERGY

PROPOSED WELL TA12

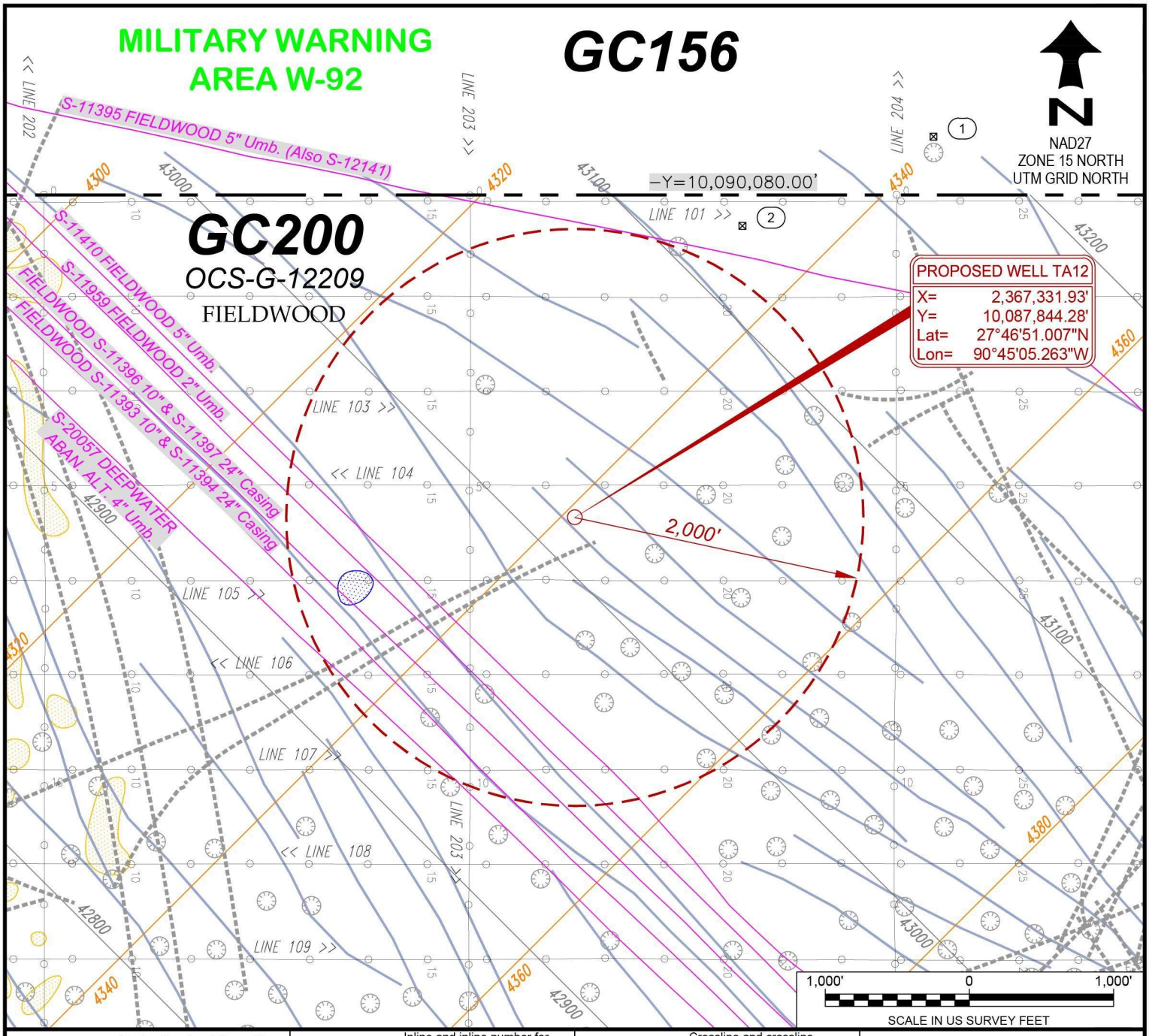
COLOR SHADED BATHYMETRY MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 16, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 1 of 5
DOC: 198253-OII-DRW-CLR-002-01		REV. 0



<< LINE 101 — Navigation trackline with name, direction run, fix, and fix number	4360 — Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)	42800 — Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4	⊠ 1 — Sonar contact & reference number
Drag scar	Depression (symbol does not reflect actual size)	Gully	Amplitude anomalies within Unit D (679' - 2,565' below seafloor)
Amplitude anomalies within Unit E (1,628' -4,753' below seafloor)			

NOTE: 3D seismic data provided in depth from client.

SONAR CONTACTS

NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
1	26.5'x12.8'x0.0'	2,369,818'	10,090,484'
2	20.0'x13.4'x1.3'	2,368,493'	10,089,866'

FIELDWOOD ENERGY

PROPOSED WELL TA12

HAZARDS MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 16, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 5 of 5
DOC: 198253-OII-DRW-CLR-002-05		REV. 0

SITE CLEARANCE LETTER

PROPOSED WELL TA14
BLOCK 200, GREEN CANYON AREA

Oceaneering Document Number:	198253-OII-RPT-WCL-03	Survey Dates:	12-13 Feb 2018
Client Document Number:	N/A	Location:	GC200
Client:	Fieldwood Energy, LLC	Vessel:	M/V *Ocean Project*

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	H. Pantlik	J. Cox	C. Baker	22Mar2019
0	Final Issue	H. Pantlik	C. Baker	C. Baker	17Apr2019

Signature Box

Harris Pantlik
Geoscientist

Fieldwood Energy, LLC
2000 W Sam Houston Pkwy S Suite 1200
Houston, TX 77042

ATTN: Mr. Eric Kubera

Well Site Clearance Letter
Proposed Well TA14
Block 200 (OCS-G-12209), Green Canyon Area

INTRODUCTION

Fieldwood Energy, LLC (Fieldwood) contracted Oceaneering International, Inc. (OII) to prepare a well site clearance letter for the proposed drilling location of Well TA14 in Block 200 (OCS-G-12209), Green Canyon Area (GC). The data used for the well site clearance letter is based on the interpretation of high-resolution Autonomous Underwater Vehicle (AUV) data collected by OII and an exploration-quality 3D seismic volume licensed by Fieldwood. OII completed an archaeological and geohazard assessment titled "*AUV/3D Seismic Shallow Hazard and Archaeological Report, Block 200 (OCS-G-12209), Green Canyon Area, Gulf of Mexico*". This assessment was submitted to Fieldwood in March 2018, and this well site clearance letter is based on the findings provided within that report.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius of the proposed Well TA14 surface location. The depth limit of the investigation is approximately 5,200 feet below the seafloor (BSF). This assessment and enclosures presented with this letter comply with the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Notice To Lessees (NTL) No. 2008-G05 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeology), and NTL No. 2009-G40 (Deepwater Benthic Communities).

WELL LOCATION

The coordinates and calls for the proposed Well TA14 surface location are tabulated below:

Table 1. Proposed Well TA14 Surface Location

Well	Easting (feet)	Northing (feet)	Latitude	Longitude	Calls From GC200	
TA14	2,370,320.69'	10,085,321.90'	27° 46' 25.497" N	90° 44' 32.518" W	5,679.31' FEL	4,785.10' FNL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93° 00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00° 00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 6). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed Well TA14 surface location and the 2,000-foot radius circle centered at the surface location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Hazard Map (Sheet 5).

SURVEY METHODS

AUV Survey Data

The high-resolution AUV data were collected using OII's *O-Surveyor III* AUV on February 12 and 13, 2018. The AUV remote-sensing instruments include a Simrad EM 2040 Multibeam Echosounder (200 kHz), EdgeTech 2200-M Full Spectrum Chirp Side Scan Sonar (120/410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5 – 10.0 kHz). In general, the AUV survey grid pattern consisted of parallel east-west primary tracklines and parallel north-south tie lines. The primary trackline spacing was 200 meters (656.17 feet), and the tie lines were spaced at 900 meters (2,952.75 feet).

3D Seismic Data

Fieldwood provided an exploration-quality 3D seismic data volume in SEG-Y format. Inlines and crosslines are depicted on the Hazards Map (Sheet 5). The 3D data were provided at a 2-millisecond sample rate and extend to the full depth of the study. The 3D seismic data is a zero phase wavelet and the seafloor reflector is represented by a strong positive amplitude peak flanked by troughs with absolute amplitude values of approximately one-half of the peak value. The 3D seismic data are in the depth domain and the computed spectrum is provided in Figure 1. The inlines of the data run southwest to northeast and are spaced at 30-meter (98.42-foot) intervals. The crosslines run southeast to northwest and are spaced at 25-meter (82.02-foot) intervals.

BATHYMETRY AND SEAFLOOR GRADIENTS

Bathymetry was processed using the AUV multibeam and is shown on the Color Shaded Bathymetry Map (Sheet 1) at 10-foot contour intervals. The bathymetry indicates the water depth at the proposed Well TA14 location is 2,486 feet Mean Seal Level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 2,423 feet MSL in the west-northwest to 2,542 feet MSL in the southeast (Sheet 1). At the proposed well, the bathymetry indicates the seafloor is smooth and slopes to the southeast at an average gradient of 1.4°. Small seafloor irregularities in the area are observed as seafloor gullies. Within the 2,000-foot radius, the highest localized seafloor gradient measures 6° and occurs along a drag scar located 1,250 feet east of the proposed well (Sheet 2).

SEAFLOOR SEDIMENTS AND HAZARDS

The side scan sonar images (Sheet 3; Figure 2) exhibit primarily low to moderate acoustic reflectivity. Additionally, the 3D seafloor amplitude image (Sheet 4) displays a range of low to moderate acoustic amplitudes within the 2,000-foot radius and agrees well with the side scan sonar images. These low to moderate acoustic reflectivity and seafloor amplitudes indicate finely textured seafloor sediments likely comprised of hemipelagic clay (very soft silty clay).

The side scan sonar and multibeam images show numerous gullies and depressions on the seafloor (Sheet 5). The gullies exhibit widths between 30 and 120 feet and negative relief of up to 3 feet below the ambient seafloor. Localized seafloor gradients across these gullies range from 2° – 4° (Sheet 4). The subbottom profiler images suggest these gullies have occupied the same position for several thousand years (Figure 3). The subbottom profiler records do not show any lenses of sediment being deposited or transported in the gullies. Bottom currents may aid in transporting sediment along the gullies and presumed to be on the order of magnitude of a turbidity flow or current. The low sediment density of these types of flows should have no impact on drilling or development activities.

The depressions are potentially created by the vertical migration of fluids through fractures in unconsolidated to semi-consolidated sediments. Slower migration of fluids and gas are less capable of entraining large amounts of sediments and often result in the development of small seafloor features

such as depressions. The subbottom profile records do not show any shallow gas accumulations associated with the depressions suggesting they are due to dewatering. The depressions average 6 feet in diameter and are less than one foot in depth. Drag scars also occur throughout the study area and are attributable to lease developments activities.

POTENTIAL DEEPWATER BENTHIC COMMUNITIES

High-amplitude seismic seafloor anomalies are a potential indicator of carbonates and benthic community habitats. The seafloor at the proposed Well TA14 location and surrounding 2,000-foot radius contains no high negative or positive amplitude anomalies associated with fluid expulsion or mounded carbonates representing potential benthic communities (Sheets 4 and 5). Additionally, the side scan sonar images and subbottom profiles show no evidence of hydrocarbon seepage within 2,000 feet of the proposed Well TA14 surface location (Sheet 5; Figures 2 and 3). Impact to potential deepwater benthic communities for the proposed Well TA14 is considered negligible.

MAN-MADE HAZARDS

A review of OII and the BOEM/BSEE databases shows 2 flowlines and 2 umbilicals located within the 2,000-foot radius. The closest umbilical is located 1,393 feet southwest from the proposed Well TA14 surface location.

There are no unidentified sonar contacts within the 2,000-foot radius. The locations, lengths, widths, and heights of the unidentified sonar contacts outside the 2,000 foot radius can be found on the Side Scan Sonar Mosaic Map (Sheet 3) and Hazards Map (Sheet 5). None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

Within the study area, the AUV subbottom profiles provide high-resolution stratigraphy to a maximum depth of approximately 300 feet BSF. The subbottom profiler data exhibit continuous, sharp bottom echoes with parallel and continuous reflectors throughout the area. In general, these sediment deposits are characterized by interleaved low to moderate amplitude reflectors that represent cyclic deposition of hemipelagic clay and fine-grained turbidites. One buried fault extending from a surficial fault is observed within the proposed Well TA14 2,000-foot radius. The buried fault is observed 3,228 to 4,562 feet BSF and striking southwest to northeast. The proposed well bore path does not cross this fault plane as the fault is dipping to the northwest (Figures 3 – 6).

Within the study area, 6 sedimentary units (Units A – F), each consisting of one or more distinctive sequences, were interpreted from the AUV and 3D seismic data to approximately 5,300 feet BSF, the lower limit of investigation. The seafloor and 6 horizons mark the top and/or base of each of the successive units (Figures 4).

Unit A (Seafloor to Horizon 1)

Unit A consists mostly of low amplitude, parallel, continuous reflectors and is 438 feet thick at the well location. Unit A occurs 2, 486 – 2,924 feet BSL at the well location. Amplitudes and acoustic impedance contrasts are low and suggest the unit is comprised of mostly hemipelagic clay laid down as a drape deposit with some mass transport deposits near the base of the unit. No amplitude anomalies occur within Unit A.

Unit B (Horizon 1 to Horizon 2)

Unit B occurs from 2,917 – 3,106 feet BSL (438 – 620 feet BSF) at the proposed well location and consists of low amplitude, subparallel reflectors. The sediments in Unit B are interpreted as likely comprised of

hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit B.

Unit C (Horizon 2 to Horizon 3)
Unit C consists of variable amplitude, semi-continuous reflectors and occurs from 3,106 – 3,462 feet BSL (620 – 976 feet BSF). The unit is interpreted as hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit C.

Unit D (Horizon 3 to Horizon 4)
Unit D is comprised of subparallel to chaotic, variable amplitude reflectors and occurs from 3,462 – 4,654 feet BSL (976 – 2,168 feet BSF). The upper portion of Unit D is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit D is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within the 2,000 foot radius of the proposed well within Unit D.

Unit E (Horizon 4 to Horizon 5)
Unit E consists of subparallel to chaotic, low to medium amplitude reflectors and occurs from 4,654 – 6,597 feet BSL (2,168 – 4,111 feet BSF). The sediments within the upper portion of Unit E are interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. The middle portion of Unit E is channel fills with sandy interbeds. The lower portion of Unit E is interpreted as draped deposits that are interbedded with fine-grained turbidites, mass movement deposits, and channel fills with sandy interbeds. No amplitude anomalies are located within 2,000 feet of the proposed Well TA14 within Unit E.

Unit F (Horizon 5 to Horizon 6)
Unit F occurs from 6,597 – 7,765 BSL (4,111 – 5,279 feet BSF) and consists of variable amplitude, subparallel to chaotic reflectors. The upper portion of Unit F is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit F is interpreted as sediments of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit F.

SHALLOW GAS

Anomalies of very high amplitude are interpreted as potential regions of fluid/gas saturation usually associated with porous sands. The risk of shallow gas is interpreted based on seismic amplitude levels with geologic settings taken into account. The gas risk is assessed as being at one of the following levels:

- **Negligible:** No amplitude anomalies or other gas indicators present.
- **Low risk of gas:** Generally indicated by increased amplitude (2 – 3 times background level) and phase reversal. This may also include diffuse areas of gas blanking.
- **Moderate risk of gas:** Generally indicated by high amplitude (3 – 4 times background level) and phase reversal.
- **High risk of gas:** Generally indicated by the highest amplitudes (in excess of 4 times background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be taken into account.

Units A – C exhibit a negligible risk of gas. Units D – F all exhibit a low risk of shallow gas. The well bore path does not penetrate a high-amplitude anomaly (Figures 3 – 6).

SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a seal that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles. Several factors may contribute to SWF including high porosity and permeability, sand-prone aquifer, mechanism to pressurize, and seal. Additional details are described below:

- **Water depth and depth of burial:** Significant water depths (> 500 feet below sea level) are required for the overpressure to occur. The seal must be deeply buried (> 500 feet below the seafloor) to become sufficiently strong.
- **High deposition rates:** Sedimentation rate needs to be greater than 1,500 feet/myr to effectively seal in sands. Sedimentation rates are expected to be high within a salt withdrawal basin. Rapid burial leads to pressure disequilibrium. In addition, if these sediment 'packets' were formed through a sequence of turbidites or gravity flow, there is an increased likelihood of water saturation and overpressure (pore pressure rapidly increased and sealed by an impervious layer).
- **Suitably porous sediments:** The sediment packets comprising the risk of SWF flow are believed to contain clastic material and are thus porous.
- **Impermeable seal:** The overlying sediments are comprised of a clay facies.

All of these factors occur within the study area. Since there is presently no method for quantifying the risk of SWF, caution is recommended when drilling through units with SWF potential. Sands with SWF potential often occur in unconsolidated, overpressured sands that lie below a seal. This seal prevents dewatering and compaction after deposition. The pressure rises with overburden causing a potentially disastrous hazard for drilling operations.

Nine wells currently exist within GC200. According to information listed on the BOEM and BSEE website, 2 of these 9 wells experienced a SWF event reported at 1,266 feet BSF (TA-5 and Well No. 1 (OCS-G-12209)), correlating with Unit D in this assessment. Both SWF events were categorized as low severity flows and well integrity was maintained.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of coarse-grained channel fills below low amplitude potential seals, SWF is considered low to moderate in Unit C – E. Due to the unpredictable nature of SWF, it is advised that caution be executed for any drilling operations through these sediments.

GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross cut the normal seismic stratigraphy, much like a bottom multiple.

The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates and benthic communities may all be found in close association. There was no indication of gas hydrates, associated geologic feature, or any BSRs near the proposed well.

CONCLUSIONS

The proposed Well TA14 surface location has a water depth of 2,486 feet MSL. The seafloor at the proposed well slopes southeast at a gradient of 1.4°.

Geologic features observed in the 2,000-foot radius include: seafloor gullies, buried fault, depressions, and drag scars.

No high acoustic reflectivity (side scan sonar) or seafloor amplitude anomalies (3D seismic) indicating the occurrence of hardgrounds, carbonates, benthic communities, or potential expulsions, are found within 2,000 feet of the proposed Well TA14 location.

No unidentified sonar contacts are noted within the proposed Well TA14 2,000-foot radius. None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

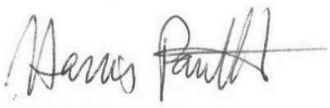
Two flowlines and two umbilicals are located within 2,000 feet of the proposed Well TA14 surface location. The closest umbilical (S-11410 Fieldwood 5") is located 1,393 feet southwest of the proposed Well TA14.

The assessment of seismic profiles suggests stratigraphic units at the proposed Well TA14 drill site exhibit a negligible risk of gas in Units A – D, and a low risk of gas in Units E – F.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Unit C – E.

Thank you for this opportunity to be of service. Please contact us if you have any questions concerning this assessment.

Sincerely,



Harris Pantlik
Geoscientist

ENCLOSURES

Figure 1. Computed frequency at the proposed Well TA14 location.
Figure 2. Side scan sonar image (Line 108) showing the proposed Well TA14 location.
Figure 3. Subbottom profile record (Line 108) showing the proposed Well TA14 location.
Figure 4. 3D seismic inline (4380) showing the proposed Well TA14 location.
Figure 5. 3D seismic crossline (43032) showing the proposed Well TA14 location.
Figure 6. Top-Hole Prognosis Chart for the proposed Well TA14 location.

Sheet 1. Color Shaded Bathymetry Map
Sheet 2. Seafloor Gradient Map
Sheet 3. Side Scan Sonar Mosaic Map
Sheet 4. Seafloor Amplitude Map
Sheet 5. Hazards Map

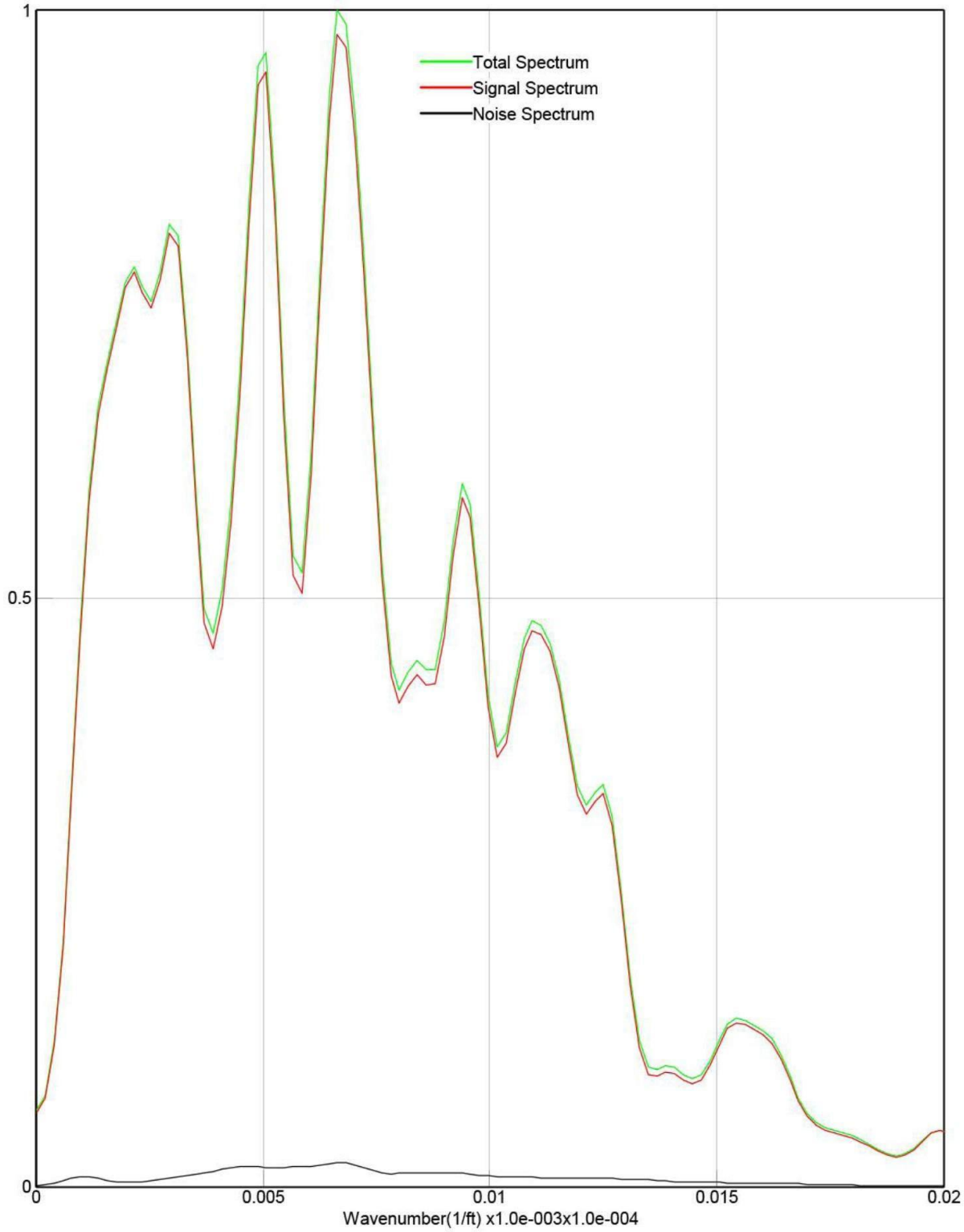
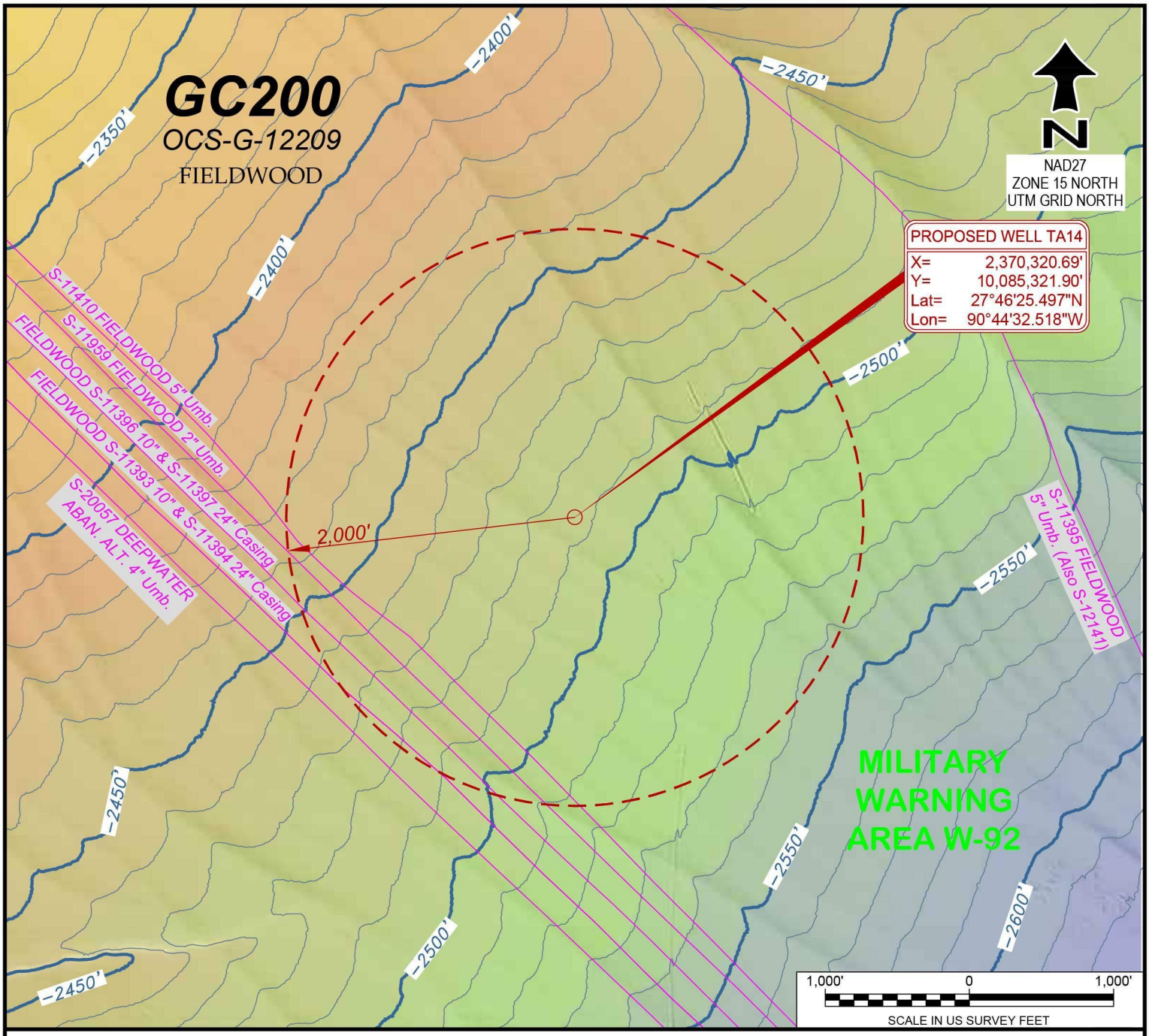


Figure 1. Computed frequency at the proposed Well TA14 location.



Multibeam Processing Sequence

- Water column velocity and density corrections applied
- Tide corrections applied using Goddard Ocean Tide Model GOT99.2
- Bin size = 3 meters (9.84 feet)
- Median filter applied
- Produced gridded-binned dataset using weighted-neighbor algorithm
- Search radius = 9 meters (29.53 feet)
- Contour interval = 10 feet
- Zero datum = Mean Sea Level

Color shaded image

Sun azimuth = 45°
Sun elevation = 30°

Shallower — Deeper

FIELDWOOD ENERGY

PROPOSED WELL TA14

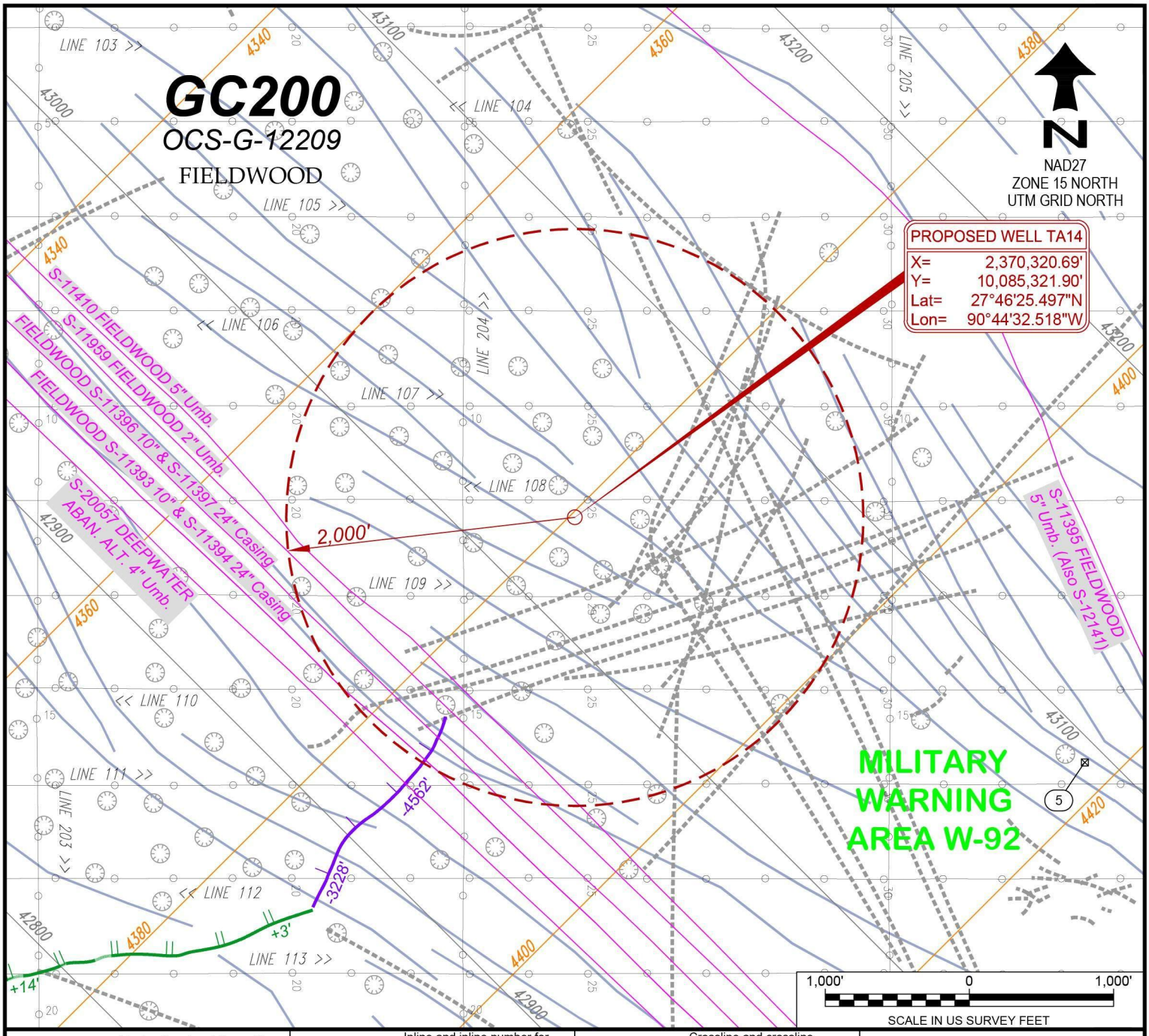
COLOR SHADED BATHYMETRY MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 1 of 5
DOC: 198253-OII-DRW-CLR-003-01		REV. 0



Navigation trackline with name, direction run, fix, and fix number	Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)	Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4	Sonar contact & reference number
Surface fault with scarp height and seafloor displacement in feet (Hachures on downthrown side)	Drag scar	Depression (symbol does not reflect actual size)	Gully
Normal fault with depth of burial (Hachures on downthrown side)			

NOTE: 3D seismic data provided in depth from client.

SONAR CONTACTS

NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
5	482.4'x12.7'x0.0'	2,373,855'	10,083,624'

PROPOSED WELL TA14

HAZARDS MAP

Block 200, Green Canyon Area

FIELDWOOD ENERGY

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019	
CKD: D. Pierrottie	APP: C. Baker	SHEET 5 of 5	REV. 0
DOC: 198253-OII-DRW-CLR-003-05			

FIELDWOOD ENERGY

WELL SITE CLEARANCE LETTER

PROPOSED WELL TA16
BLOCK 200, GREEN CANYON AREA

OCEANEERING®

Oceaneering Document Number:	198253-OII-RPT-WCL-04	Survey Dates:	12-13 Feb, 2018
Client Document Number:	N/A	Location:	GC200
Client:	Fieldwood Energy, LLC	Vessel:	M/V *Ocean Project*

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	H. Pantlik	J. Cox	C. Baker	22Mar2019
0	Final Issue	H. Pantlik	C. Baker	C. Baker	17Apr2019

Signature Box

Harris Pantlik
Geoscientist

Fieldwood Energy, LLC
2000 W Sam Houston Pkwy S Suite 1200,
Houston, TX 77042

ATTN: Mr. Eugene Wissinger

Well Site Clearance Letter
Proposed Well TA16
Block 200 (OCS-G-12209), Green Canyon Area

INTRODUCTION

Fieldwood Energy, LLC (Fieldwood) contracted Oceaneering International, Inc. (OII) to prepare a well site clearance letter for the proposed drilling location of Well TA16 in Block 200 (OCS-G-12209), Green Canyon (GC) Area. The data used for the well site clearance letter is based on the interpretation of high-resolution Autonomous Underwater Vehicle (AUV) data collected by OII and an exploration-quality 3D seismic volume licensed by Fieldwood. OII completed an archaeological and geohazard assessment titled "*AUV/3D Seismic Shallow Hazard and Archaeological Report, Block 200 (OCS-G-12209), Green Canyon Area, Gulf of Mexico*". The assessment was submitted to Fieldwood in March 2018, and this well site clearance letter is based on the findings provided within that report.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius of the proposed Well TA16 surface location. The depth limit of the investigation is approximately 5,400 feet below the seafloor (BSF). This assessment and enclosures presented with this letter comply with the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Notice To Lessees (NTL) No. 2008-G05 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeology), and NTL No. 2009-G40 (Deepwater Benthic Communities).

WELL LOCATION

The coordinates and calls for the proposed Well TA16 surface location are tabulated below:

Table 1. Proposed Well TA16 Surface Location

Well	Easting (feet)	Northing (feet)	Latitude	Longitude	Calls From GC200	
TA16	2,371,615.49'	10,080,061.86'	27° 45' 33.195" N	90° 44' 19.186" W	4,384.51' FEL	5,821.86' FSL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93° 00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00° 00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 5). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed Well TA16 surface location and the 2,000-foot radius circle centered at the surface location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Hazard Map (Sheet 5).

SURVEY METHODS

AUV Survey Data

The high-resolution AUV data were collected using OII's *O-Surveyor III* AUV on February 12 and 13, 2018. The AUV remote-sensing instruments include a Simrad EM 2040 Multibeam Echosounder (200 kHz), EdgeTech 2200-M Full Spectrum Chirp Side Scan Sonar (120/410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5 – 10.0 kHz). In general, the AUV survey grid pattern consisted of parallel east-west primary tracklines and parallel north-south tie lines. The primary trackline spacing was 200 meters (656.17 feet), and the tie lines were spaced at 900 meters (2,952.75 feet).

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Fieldwood provided an exploration-quality 3D seismic data volume in SEG-Y format. Inlines and crosslines are depicted on the Hazards Map (Sheet 5). The 3D data were provided at a 2-millisecond sample rate and extend to the full depth of the study. The 3D seismic data is a zero phase wavelet and the seafloor reflector is represented by a strong positive amplitude peak flanked by troughs with absolute amplitude values of approximately one-half of the peak value. The 3D seismic data are in the depth domain and the computed spectrum is provided in Figure 1. The inlines of the data run southwest to northeast and are spaced at 30-meter (98.42-foot) intervals. The crosslines run southeast to northwest and are spaced at 25-meter (82.02-foot) intervals.

BATHYMETRY AND SEAFLOOR GRADIENTS

Bathymetry was processed using the AUV multibeam and is shown on the Color Shaded Bathymetry Map (Sheet 1) at 10-foot contour intervals. The bathymetry indicates the water depth at the proposed Well TA16 location is 2,594 feet Mean Seal Level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 2,535 feet MSL in the west-northwest to 2,655 feet MSL in the southeast (Sheet 1). At the proposed well, the bathymetry indicates the seafloor is slightly irregular and slopes to the southeast at an average gradient of 1.0°. Small seafloor irregularities in the area are observed as seafloor gullies, depressions, and drag scars. Within the 2,000-foot radius, the highest localized seafloor gradient measures 9° and occurs along a drag scar located 1,555 feet east-southeast of the proposed well (Sheet 2).

SEAFLOOR SEDIMENTS AND HAZARDS

The side scan sonar images (Sheet 3; Figure 2) exhibit primarily low to moderate acoustic reflectivity. Additionally, the 3D seafloor amplitude image (Sheet 4) displays a range of low to moderate acoustic amplitudes within the 2,000-foot radius and agrees well with the side scan sonar images. These low to moderate acoustic reflectivity and seafloor amplitudes indicate finely textured seafloor sediments likely comprised of hemipelagic clay (very soft silty clay).

The side scan sonar and multibeam images show numerous gullies and depressions on the seafloor (Sheet 5). The gullies exhibit widths between 30 and 120 feet and negative relief of up to 3 feet below the ambient seafloor. Localized seafloor gradients across these gullies range from 2° – 4° (Sheet 4). The subbottom profiler images suggest these gullies have occupied the same position for several thousand years (Figure 3). The subbottom profiler records do not show any lenses of sediment being deposited or transported in the gullies. Bottom currents may aid in transporting sediment along the gullies and presumed to be on the order of magnitude of a turbidity flow or current. The low sediment density of these types of flows should have no impact on drilling or development activities.

The depressions are potentially created by the vertical migration of fluids through fractures in unconsolidated to semi-consolidated sediments. Slower migration of fluids and gas are less capable of

entraining large amounts of sediments and often result in the development of small seafloor features such as depressions. The subbottom profile records do not show any shallow gas accumulations associated with the depressions suggesting they are due to dewatering. The depressions average 6 feet in diameter and are less than one foot in depth. Drag scars also occur throughout the study area and are attributable to lease developments activities.

POTENTIAL DEEPWATER BENTHIC COMMUNITIES

High-amplitude seismic seafloor anomalies are a potential indicator of carbonates and benthic community habitats. The seafloor at the proposed Well TA16 location and surrounding 2,000-foot radius contains no high negative or positive amplitude anomalies associated with fluid expulsion or mounded carbonates representing potential benthic communities (Sheets 4 and 5). Additionally, the side scan sonar images and subbottom profiles show no evidence of hydrocarbon seepage within 2,000 feet of the proposed Well TA16 surface location (Sheet 5; Figures 2 and 3). Impact to potential deepwater benthic communities for the proposed Well TA16 is considered negligible.

MAN-MADE HAZARDS

A review of OII and the BOEM/BSEE databases shows two flowlines and three umbilicals located within the 2,000-foot radius. The closest umbilical (S-20057 Deepwater Abandonment Alternative 4") is located 547 feet east-northeast from the proposed Well TA16 surface location.

There are no unidentified sonar contacts within the 2,000-foot radius. The locations, lengths, widths, and heights of the unidentified sonar contacts outside the 2,000 foot radius can be found on the Side Scan Sonar Mosaic Map (Sheet 3) and Hazards Map (Sheet 5). None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

Within the study area, the AUV subbottom profiles provide high-resolution stratigraphy to a maximum depth of approximately 300 feet BSF. The subbottom profiler data exhibit continuous, sharp bottom echoes with parallel and continuous reflectors throughout the area. In general, these sediment deposits are characterized by interleaved moderate to low amplitude reflectors that represent cyclic deposition of hemipelagic clay and fine-grained turbidites.

Within the study area, 6 sedimentary units (Units A – F), each consisting of one or more distinctive sequences, were interpreted from the AUV and 3D seismic data to approximately 5,400 feet BSF, the lower limit of investigation. The seafloor and 6 horizons mark the top and/or base of each of the successive units (Figures 4).

Unit A (Seafloor to Horizon 1)

Unit A consists mostly of low amplitude, parallel, continuous reflectors and is 394 feet thick at the well location. Unit A occurs 2,594 – 2,988 feet BSL at the well location. Amplitudes and acoustic impedance contrasts are low and suggest the unit is comprised of mostly hemipelagic clay laid down as a drape deposit with some mass transport deposits near the base of the unit. No amplitude anomalies occur within Unit A.

Unit B (Horizon 1 to Horizon 2)

Unit B occurs from 2,988 – 3,151 feet BSL (394 – 557 feet BSF) at the proposed well location and consists of low amplitude, subparallel reflectors. The sediments in Unit B are interpreted as likely comprised of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit B.

Unit C (Horizon 2 to Horizon 3)
Unit C consists of variable amplitude, semi-continuous reflectors and occurs from 3,151 – 3,589 feet BSL (557 – 995 feet BSF). The unit is interpreted as hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit C.

Unit D (Horizon 3 to Horizon 4)
Unit D is comprised of subparallel to chaotic, variable amplitude reflectors and occurs from 3,589 – 4,712 feet BSL (995 – 2,118 feet BSF). The upper portion of Unit D is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit D is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within in the 2,000 foot radius of the proposed well.

Unit E (Horizon 4 to Horizon 5)
Unit E consists of subparallel to chaotic, low to medium amplitude reflectors and occurs from 4,712 – 6,622 feet BSL (2,168 – 4,111 feet BSF). The sediments within the upper portion of Unit E are interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. The middle portion of Unit E is channel fills with sandy interbeds. The lower portion of Unit E is interpreted as draped deposits that are interbedded with fine-grained turbidites, mass movement deposits, and channel fills with sandy interbeds. No amplitude anomalies are located within 2,000 feet of the proposed Well TA16.

Unit F (Horizon 5 to Horizon 6)
Unit F occurs from 6,622 – 7,961 BSL (4,111 – 5,279 feet BSF) and consists of variable amplitude, subparallel to chaotic reflectors. The upper portion of Unit F is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit F is interpreted as sediments of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit F.

SHALLOW GAS

Anomalies of very high amplitude are interpreted as potential regions of fluid/gas saturation usually associated with porous sands. The risk of shallow gas is interpreted based on seismic amplitude levels with geologic settings taken into account. The gas risk is assessed as being at one of the following levels:

- **Negligible:** No amplitude anomalies or other gas indicators present.
- **Low risk of gas:** Generally indicated by increased amplitude (2 – 3 times background level) and phase reversal. This may also include diffuse areas of gas blanking.
- **Moderate risk of gas:** Generally indicated by high amplitude (3 – 4 times background level) and phase reversal.
- **High risk of gas:** Generally indicated by the highest amplitudes (in excess of 4 times background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be taken into account.

Units A – C exhibit a negligible risk of gas. Units D – F all exhibit a low risk of shallow gas. The well bore path does not penetrate any high-amplitude anomalies (Figures 3 – 6).

SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a seal that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles. Several factors may contribute to shallow water flows, including high porosity and permeability, sand-prone aquifer, mechanism to pressurize, and seal. Additional details are described below:

- **Water depth and depth of burial:** Significant water depths (> 500 feet below sea level) are required for the overpressure to occur. The seal must be deeply buried (> 500 feet below the seafloor) to become sufficiently strong.
- **High deposition rates:** Sedimentation rate needs to be greater than 1,500 feet/myr to effectively seal in sands. Sedimentation rates are expected to be high within a salt withdrawal basin. Rapid burial leads to pressure disequilibrium. In addition, if these sediment 'packets' were formed through a sequence of turbidites or gravity flow, there is an increased likelihood of water saturation and overpressure (pore pressure rapidly increased and sealed by an impervious layer).
- **Suitably porous sediments:** The sediment packets comprising the risk of shallow water flow are believed to contain clastic material and are thus porous.
- **Impermeable seal:** The overlying sediments are comprised of a clay facies.

All of these factors occur within the study area. Since there is presently no method for quantifying the risk of shallow water flow, caution is recommended when drilling through units with shallow water flow potential. Sands with SWF potential often occur in unconsolidated, overpressured sands that lie below a seal. This seal prevents dewatering and compaction after deposition. The pressure rises with overburden causing a potentially disastrous hazard for drilling operations.

Nine wells currently exist within GC200. According to information listed on the BOEM and BSEE website, 2 of these 9 wells experienced a SWF event reported at 1,266 feet BSF (TA-5 and Well No. 1 (OCS-G-12209)), correlating with Unit D in this assessment. Both SWF events were categorized as low severity flows and well integrity was maintained.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of coarse-grained channel fills below low amplitude potential seals, SWF is considered low to moderate in Unit C – E. Due to the unpredictable nature of SWF, it is advised that caution be executed for any drilling operations through these sediments.

GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross cut the normal seismic stratigraphy, much like a bottom multiple.

The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates and benthic communities may all be found in close association. There was no indication of gas hydrates, associated geologic feature, or any BSRs near the proposed well.

CONCLUSIONS

The proposed Well TA16 surface location has a water depth of 2,594 feet MSL. The seafloor at the proposed well slopes southeast at a gradient of 1.0°.

Geologic features observed in the 2,000-foot radius include seafloor gullies, depressions, and drag scars. The proposed well is located on the edge of a seafloor gully.

No high acoustic reflectivity (side scan sonar) or seafloor amplitude anomalies (3D seismic) indicating the occurrence of hardgrounds, carbonates, benthic communities, or potential expulsions, are found within 2,000 feet of the proposed Well TA16 location.

No unidentified sonar contacts are noted within the proposed Well TA16 2,000-foot radius. None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

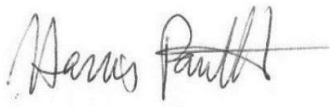
Two flowlines and three umbilicals are located within 2,000 feet of the proposed Well TA16 surface location. The closest umbilical (S-20057 Deepwater Abandonment Alternative 4") is located 547 feet east-northeast from the proposed Well TA16 surface location.

The assessment of seismic profiles suggests stratigraphic units at the proposed Well TA16 drill site exhibit a negligible risk of gas in Units A – D, and a low risk of gas in Units E – F.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Unit C – E.

Thank you for this opportunity to be of service. Please contact us if you have any questions concerning this assessment.

Sincerely,



Harris Pantlik
Geoscientist

ENCLOSURES

Figure 1. Computed Frequency at the proposed Well TA16 location.
Figure 2. Side scan sonar image (line 116) showing the proposed Well TA16 location.
Figure 3. Subbottom profile record (line 116) showing the proposed Well TA16 location.
Figure 4. 3D seismic Inline (4427) showing the proposed Well TA16 location.
Figure 5. 3D seismic Crossline (42982) showing the proposed Well TA16 location.
Figure 6. Top-Hole Prognosis Chart for the proposed Well TA16 location.

Sheet 1. Color Shaded Bathymetry Map
Sheet 2. Seafloor Gradient Map
Sheet 3. Side Scan Sonar Mosaic Map
Sheet 4. Seafloor Amplitude Map
Sheet 5. Hazards Map

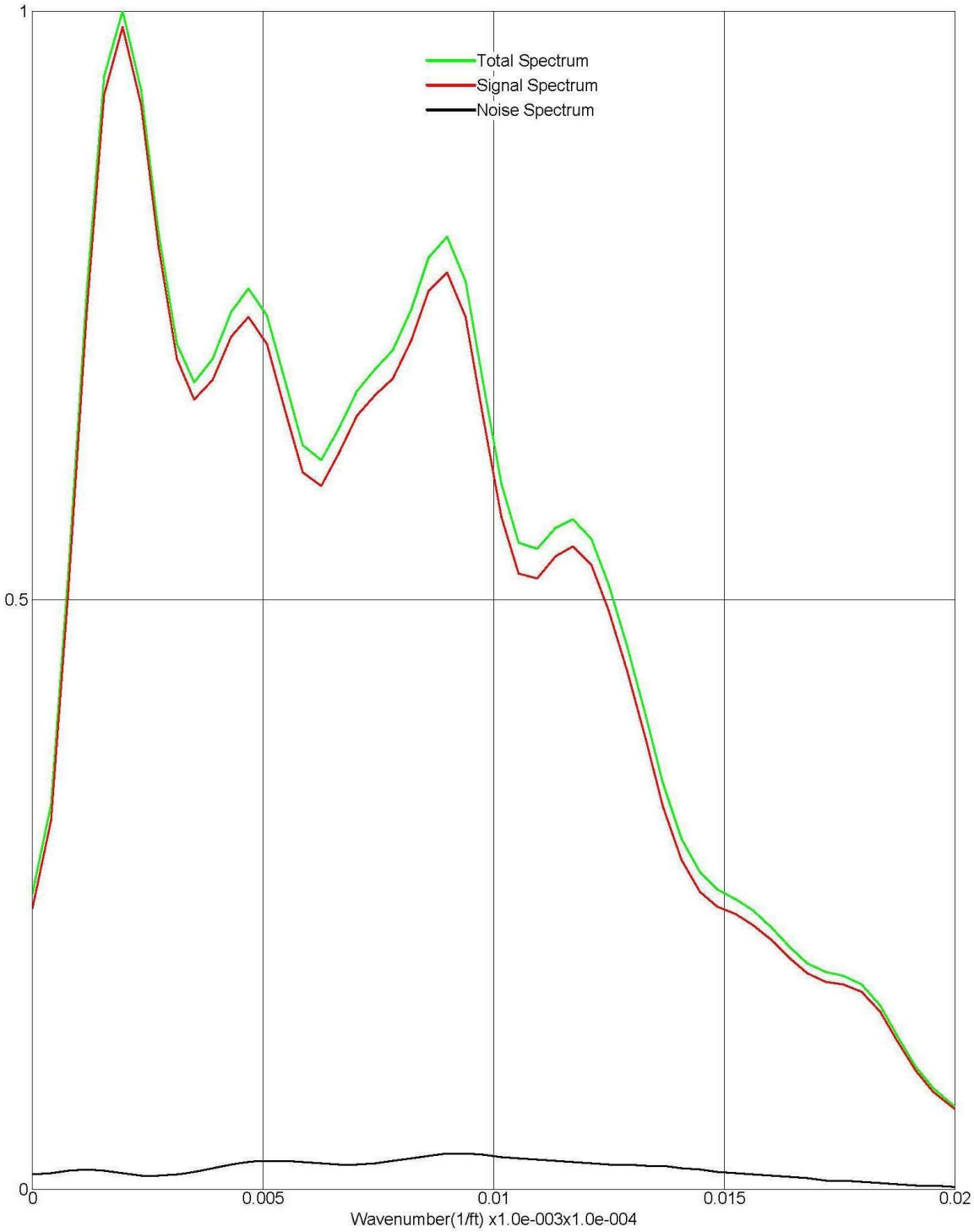
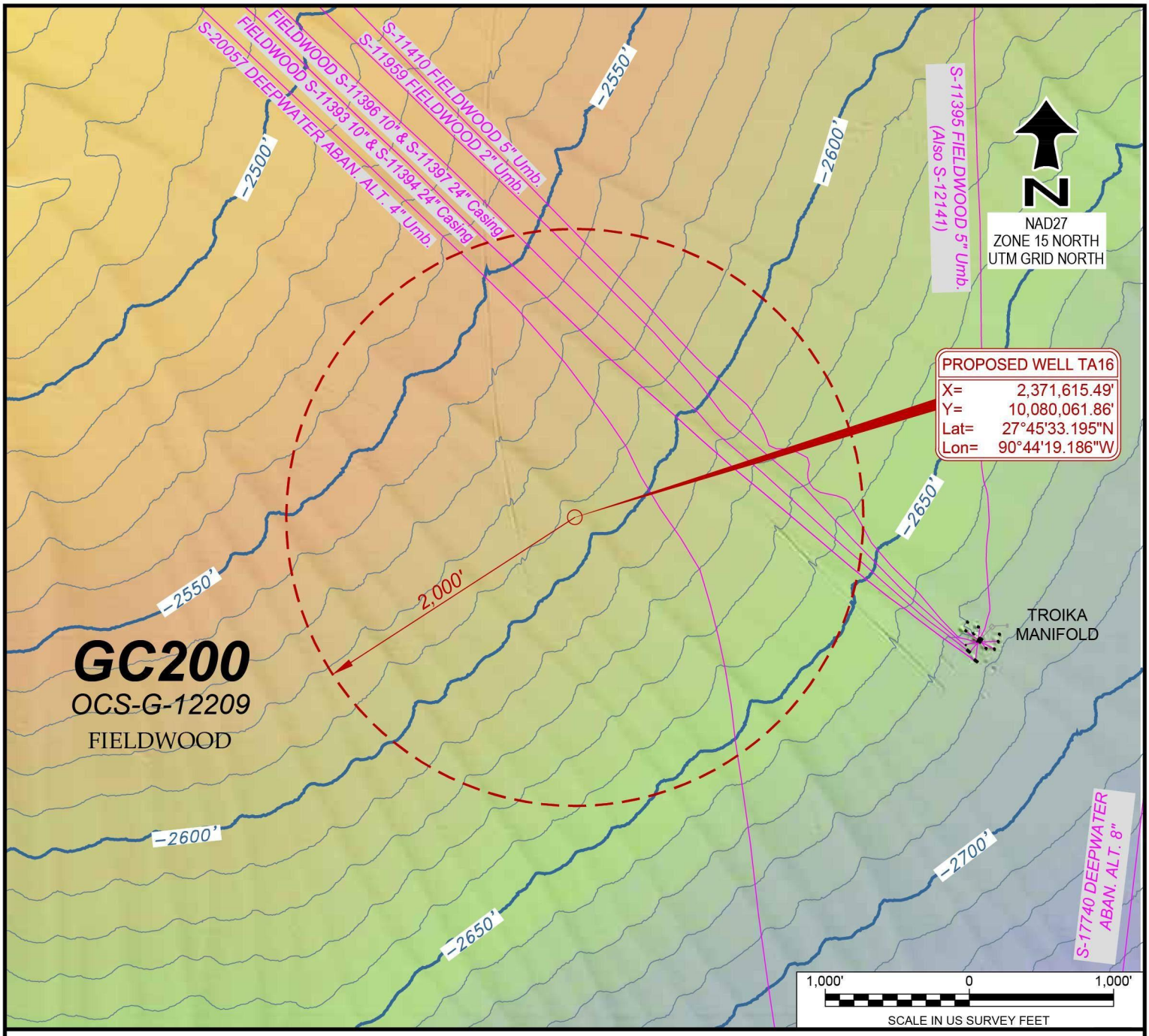


Figure 1. Computed frequency at the proposed Well TA16.



Multibeam Processing Sequence

- Water column velocity and density corrections applied
- Tide corrections applied using Goddard Ocean Tide Model GOT99.2
- Bin size = 3 meters (9.84 feet)
- Median filter applied
- Produced gridded-binned dataset using weighted-neighbor algorithm
- Search radius = 9 meters (29.53 feet)
- Contour interval = 10 feet
- Zero datum = Mean Sea Level

Color shaded image

Sun azimuth = 45°
Sun elevation = 30°

Shallower — Deeper

FIELDWOOD ENERGY

PROPOSED WELL TA16

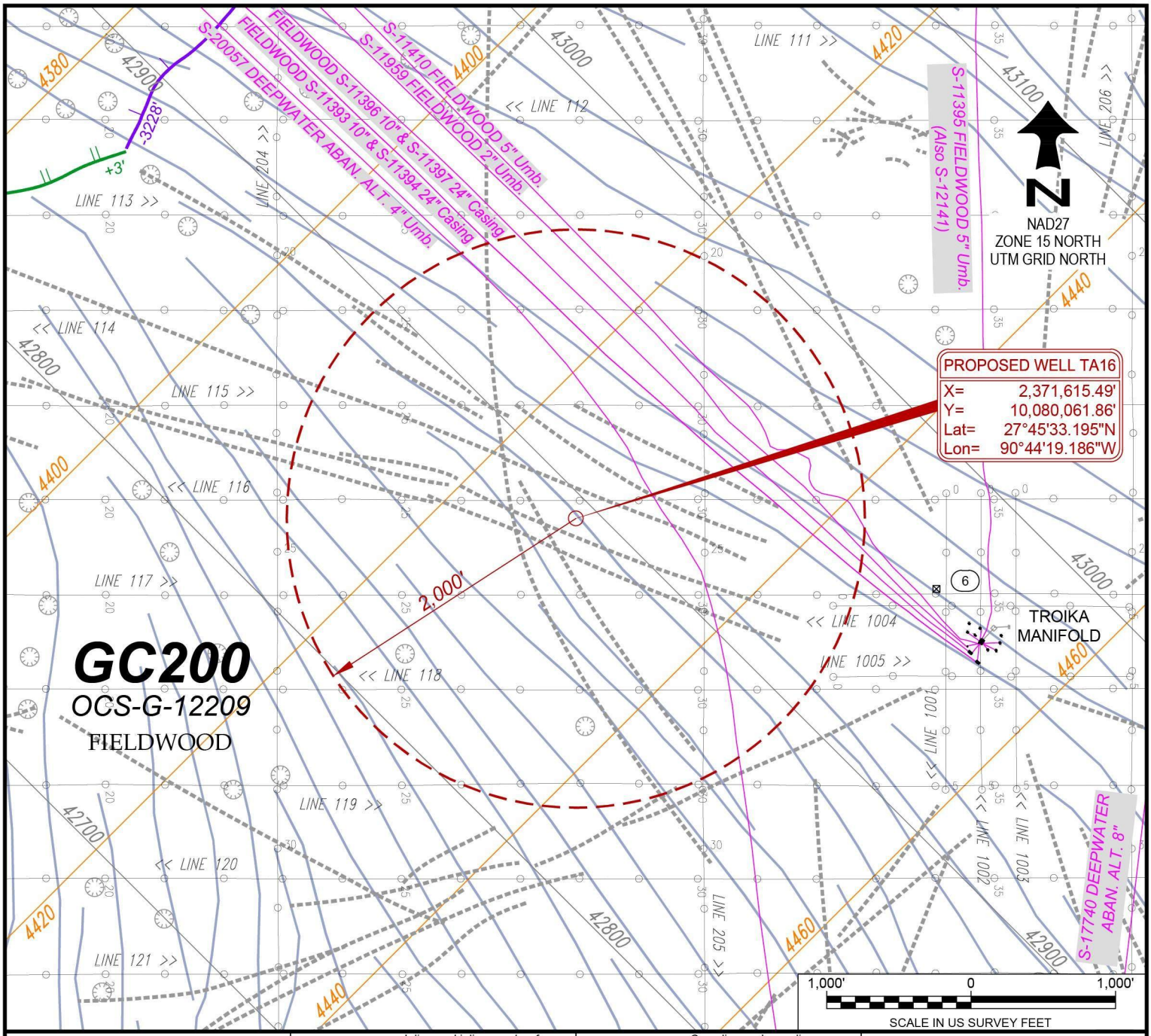
COLOR SHADED BATHYMETRY MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 1 of 5
DOC: 198253-OII-DRW-CLR-004-01		REV. 0



<< LINE 101 — Navigation trackline with name, direction run, fix, and fix number	4360 — Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)	42800 — Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4	⊠ 6 — Sonar contact & reference number
+3' — Surface fault with scarp height and seafloor displacement in feet (Hachures on downthrown side)	Drag scar	Depression (symbol does not reflect actual size)	Gully
-3228' — Normal fault with depth of burial (Hachures on downthrown side)			

NOTE: 3D seismic data provided in depth from client.

SONAR CONTACTS

NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
6	12.3'x5.2'x0.0'	2,374,111'	10,079,575'

FIELDWOOD ENERGY

PROPOSED WELL TA16

HAZARDS MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 5 of 5
DOC: 198253-OII-DRW-CLR-004-05		REV. 0

WELL SITE CLEARANCE LETTER

PROPOSED WELL TA17R
BLOCK 200, GREEN CANYON AREA

Oceaneering Document Number:	198253-OII-RPT-WCL-05	Survey Dates:	12-13 Feb, 2018
Client Document Number:	N/A	Location:	GC200
Client:	Fieldwood Energy, LLC	Vessel:	M/V *Ocean Project*

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	H. Pantlik	J. Cox	C. Baker	22Mar2019
0	Final Issue	H. Pantlik	C. Baker	C. Baker	17Apr2019

Signature Box

Harris Pantlik
Geoscientist

Fieldwood Energy, LLC
2000 W Sam Houston Pkwy Suite 1200
Houston, TX 77042

ATTN: Mr. Eric Kubera

Well Site Clearance Letter
Proposed Well TA17R
Block 200 (OCS-G-12209), Green Canyon Area

INTRODUCTION

Fieldwood Energy, LLC (Fieldwood) contracted Oceaneering International, Inc. (OII) to prepare a well site clearance letter for the proposed drilling location of Well TA17R in Block 200 (OCS-G-12209), Green Canyon Area (GC). The data used for the well site clearance letter is based on the interpretation of high-resolution Autonomous Underwater Vehicle (AUV) data collected by OII and an exploration-quality 3D seismic volume licensed by Fieldwood. OII completed an archaeological and geohazard assessment titled "*AUV/3D Seismic Shallow Hazard and Archaeological Report, Block 200 (OCS-G-12209), Green Canyon Area, Gulf of Mexico*". This assessment was submitted to Fieldwood in March 2018, and this well site clearance letter is based on the findings provided within that report.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius of the proposed Well TA17R surface location. The depth limit of the investigation is approximately 5,600 feet below the seafloor (BSF). This assessment and enclosures presented with this letter comply with the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Notice To Lessees (NTL) No. 2008-G05 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeology), and NTL No. 2009-G40 (Deepwater Benthic Communities).

WELL LOCATION

The coordinates and calls for the proposed Well TA17R surface location are tabulated below:

Table 1. Proposed Well TA17R Surface Location

Well	Easting (feet)	Northing (feet)	Latitude	Longitude	Calls From GC200	
TA17R	2,374,147.00'	10,078,611.00'	27° 45' 18.372" N	90° 43' 51.317" W	1,853.00' FEL	4,371.00' FSL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93° 00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00° 00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 5). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed Well TA17R surface location and the 2,000-foot radius circle centered at the surface location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Hazard Map (Sheet 5).

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3D Seismic Data

Fieldwood provided an exploration-quality 3D seismic data volume in SEG-Y format. Inlines and crosslines are depicted on the Hazards Map (Sheet 5). The 3D data were provided at a 2-millisecond sample rate and extend to the full depth of the study. The 3D seismic data is a zero phase wavelet and the seafloor reflector is represented by a strong positive amplitude peak flanked by troughs with absolute amplitude values of approximately one-half of the peak value. The 3D seismic data are in the depth domain and the computed spectrum is provided in Figure 1. The inlines of the data run southwest to northeast and are spaced at 30-meter (98.42-foot) intervals. The crosslines run southeast to northwest and are spaced at 25-meter (82.02-foot) intervals.

BATHYMETRY AND SEAFLOOR GRADIENTS

Bathymetry was processed using the AUV multibeam and is shown on the Color Shaded Bathymetry Map (Sheet 1) at 10-foot contour intervals. The bathymetry indicates the water depth at the proposed Well TA17R location is 2,676 feet Mean Seal Level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 2,619 feet MSL in the northwest to 2,739 feet MSL in the southeast (Sheet 1). At the proposed well, the bathymetry indicates the seafloor is benign and slopes to the southeast at an average gradient of 1.7°. Small seafloor irregularities in the area are observed as seafloor gullies, depressions, and drag scars. Within the 2,000-foot radius, the highest localized seafloor gradient measures 7° and occurs along a drag scar located 253 feet north of the proposed well (Sheet 2).

SEAFLOOR SEDIMENTS AND HAZARDS

The side scan sonar images (Sheet 3; Figure 2) exhibit primarily low to moderate acoustic reflectivity. Additionally, the 3D seafloor amplitude image (Sheet 4) displays a range of low to moderate acoustic amplitudes within the 2,000-foot radius and agrees well with the side scan sonar images. These low to moderate acoustic reflectivity and seafloor amplitudes indicate finely textured seafloor sediments likely comprised of hemipelagic clay (very soft silty clay).

The side scan sonar and multibeam images show numerous gullies and depressions on the seafloor (Sheet 5). The gullies exhibit widths between 30 and 120 feet and negative relief of up to 3 feet below the ambient seafloor. Localized seafloor gradients across these gullies range from 2° – 4° (Sheet 4). The subbottom profiler images suggest these gullies have occupied the same position for several thousand years (Figure 3). The subbottom profiler records do not show any lenses of sediment being deposited or transported in the gullies. Bottom currents may aid in transporting sediment along the gullies and presumed to be on the order of magnitude of a turbidity flow or current. The low sediment density of these types of flows should have no impact on drilling or development activities.

The depressions are potentially created by the vertical migration of fluids through fractures in unconsolidated to semi-consolidated sediments. Slower migration of fluids and gas are less capable of entraining large amounts of sediments and often result in the development of small seafloor features

such as depressions. The subbottom profile records do not show any shallow gas accumulations associated with the depressions suggesting they are due to dewatering. The depressions average 6 feet in diameter and are less than one foot in depth. Drag scars also occur throughout the study area and are attributable to lease developments activities.

POTENTIAL DEEPWATER BENTHIC COMMUNITIES

High-amplitude seismic seafloor anomalies are a potential indicator of carbonates and benthic community habitats. The seafloor at the proposed Well TA17R location and surrounding 2,000-foot radius contains no high negative or positive amplitude anomalies associated with fluid expulsion or mounded carbonates representing potential benthic communities (Sheets 4 and 5). Additionally, the side scan sonar images and subbottom profiles show no evidence of hydrocarbon seepage within 2,000 feet of the proposed Well TA17R surface location (Sheet 5; Figures 2 and 3). Impact to potential deepwater benthic communities for the proposed Well TA17R is considered negligible.

MAN-MADE HAZARDS

A review of OII and the BOEM/BSEE databases shows four flowlines, eight wells, two pipeline end terminations (PLETs) and four umbilicals located within the 2,000-foot radius. The closest infrastructure is the PLET #5 is located 520 feet north-northeast from the proposed Well TA17R surface location.

One unidentified sonar contact measuring 12.3 feet in length, 5.2 feet in width, with no measurable height is located 961 feet north of the proposed well. The locations, lengths, widths, and heights of the unidentified sonar contacts outside the 2,000 foot radius can be found on the Side Scan Sonar Mosaic Map (Sheet 3) and Hazards Map (Sheet 5). None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

Within the study area, the AUV subbottom profiles provide high-resolution stratigraphy to a maximum depth of approximately 300 feet BSF. The subbottom profiler data exhibit continuous, sharp bottom echoes with parallel and continuous reflectors throughout the area. In general, these sediment deposits are characterized by interleaved moderate to low amplitude reflectors that represent cyclic deposition of hemipelagic clay and fine-grained turbidites.

Within the study area, 6 sedimentary units (Units A – F), each consisting of one or more distinctive sequences, were interpreted from the AUV and 3D seismic data to approximately 5,600 feet BSF, the lower limit of investigation. The seafloor and 6 horizons mark the top and/or base of each of the successive units (Figures 4).

Unit A (Seafloor to Horizon 1)

Unit A consists mostly of low amplitude, parallel, continuous reflectors and is 392 feet thick at the well location. Unit A occurs 2,676 – 3,067 feet BSL at the well location. Amplitudes and acoustic impedance contrasts are low and suggest the unit is comprised of mostly hemipelagic clay laid down as a drape deposit with some mass transport deposits near the base of the unit. No amplitude anomalies occur within Unit A.

Unit B (Horizon 1 to Horizon 2)

Unit B occurs from 3,067 – 3,220 feet BSL (392 – 545 feet BSF) at the proposed well location and consists of low amplitude, subparallel reflectors. The sediments in Unit B are interpreted as likely comprised of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit B.

Unit C (Horizon 2 to Horizon 3)

Unit C consists of variable amplitude, semi-continuous reflectors and occurs from 3,220 – 3,709 feet BSL (545 – 1,034 feet BSF). The unit is interpreted as hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit C.

Unit D (Horizon 3 to Horizon 4)

Unit D is comprised of subparallel to chaotic, variable amplitude reflectors and occurs from 3,709 – 4,843 feet BSL (1,034 – 2,168 feet BSF). The upper portion of Unit D is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit D is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit D in the 2,000 foot radius of the proposed well.

Unit E (Horizon 4 to Horizon 5)

Unit E consists of subparallel to chaotic, low to medium amplitude reflectors and occurs from 4,843 – 6,827 feet BSL (2,168 – 4,152 feet BSF). The sediments within the upper portion of Unit E are interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. The middle portion of Unit E is channel fills with sandy interbeds. The lower portion of Unit E is interpreted as draped deposits that are interbedded with fine-grained turbidites, mass movement deposits, and channel fills with sandy interbeds. No amplitude anomalies are located within 2,000 feet of the proposed Well TA17R

Unit F (Horizon 5 to Horizon 6)

Unit F occurs from 6,827 – 8,254 BSL (4,152 – 5,579 feet BSF) and consists of variable amplitude, subparallel to chaotic reflectors. The upper portion of Unit F is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit F is interpreted as sediments of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit F.

SHALLOW GAS

Anomalies of very high amplitude are interpreted as potential regions of fluid/gas saturation usually associated with porous sands. The risk of shallow gas is interpreted based on seismic amplitude levels with geologic settings taken into account. The gas risk is assessed as being at one of the following levels:

- **Negligible:** No amplitude anomalies or other gas indicators present.
- **Low risk of gas:** Generally indicated by increased amplitude (2 – 3 times background level) and phase reversal. This may also include diffuse areas of gas blanking.
- **Moderate risk of gas:** Generally indicated by high amplitude (3 – 4 times background level) and phase reversal.
- **High risk of gas:** Generally indicated by the highest amplitudes (in excess of 4 times background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be taken into account.

Units A – C exhibit a negligible risk of gas. Units D – F all exhibit a low risk of shallow gas. The well bore path does not penetrate a high-amplitude anomaly (Figures 3 – 5).

SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a seal that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles. Several factors may contribute to shallow water flows, including high porosity and permeability, sand-prone aquifer, mechanism to pressurize, and seal. Additional details are described below:

- **Water depth and depth of burial:** Significant water depths (> 500 feet below sea level) are required for the overpressure to occur. The seal must be deeply buried (> 500 feet below the seafloor) to become sufficiently strong.
- **High deposition rates:** Sedimentation rate needs to be greater than 1,500 feet/myr to effectively seal in sands. Sedimentation rates are expected to be high within a salt withdrawal basin. Rapid burial leads to pressure disequilibrium. In addition, if these sediment 'packets' were formed through a sequence of turbidites or gravity flow, there is an increased likelihood of water saturation and overpressure (pore pressure rapidly increased and sealed by an impervious layer).
- **Suitably porous sediments:** The sediment packets comprising the risk of shallow water flow are believed to contain clastic material and are thus porous.
- **Impermeable seal:** The overlying sediments are comprised of a clay facies.

All of these factors occur within the study area. Since there is presently no method for quantifying the risk of shallow water flow, caution is recommended when drilling through units with shallow water flow potential. Sands with SWF potential often occur in unconsolidated, overpressured sands that lie below a seal. This seal prevents dewatering and compaction after deposition. The pressure rises with overburden causing a potentially disastrous hazard for drilling operations.

Nine wells currently exist within GC200. According to information listed on the BOEM and BSEE website, 2 of these 9 wells experienced a SWF event reported at 1,266 feet BSF (TA-5 and Well No. 1 (OCS-G-12209)), correlating with Unit D in this assessment. Both SWF events were categorized as low severity flows and well integrity was maintained.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of coarse-grained channel fills below low amplitude potential seals, SWF is considered low to moderate in Unit C – E. Due to the unpredictable nature of SWF, it is advised that caution be executed for any drilling operations through these sediments.

GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross cut the normal seismic stratigraphy, much like a bottom multiple.

The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates and benthic communities may all be found in close association. There was no indication of gas hydrates, associated geologic feature, or any BSRs near the proposed well.

CONCLUSIONS

The proposed Well TA17R surface location has a water depth of 2,676 feet MSL. The seafloor at the proposed well slopes southeast at a gradient of 1.7°.

Geologic features observed in the 2,000-foot radius include seafloor gullies, depressions, and drag scars.

No high acoustic reflectivity (side scan sonar) or seafloor amplitude anomalies (3D seismic) indicating the occurrence of hardgrounds, carbonates, benthic communities, or potential expulsions, are found within 2,000 feet of the proposed Well TA17R location.

Unidentified sonar contact No. 6 is located within the 2,000 foot radius of the proposed Well TA17R. The unidentified sonar contact is not recommended for avoidance based on archaeological potential.

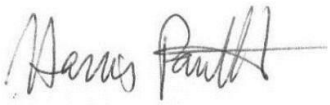
At least four flowlines, eight wells, two pipeline end terminations (PLETs) and four umbilicals located within the 2,000-foot radius of the proposed Well TA17R.

The assessment of seismic profiles suggests stratigraphic units at the proposed Well TA10 drill site exhibit a negligible risk of gas in Units A – C, and a low risk of gas in Units D – F.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Unit C – E.

Thank you for this opportunity to be of service. Please contact us if you have any questions concerning this assessment.

Sincerely,



Harris Pantlik
Geoscientist

ENCLOSURES

Figure 1. Computed frequency at the proposed Well TA17R location.
Figure 2. Side scan sonar image (Line 118) showing the proposed Well TA17R location.
Figure 3. Subbottom profile record (Line 118) showing the proposed Well TA17R location.
Figure 4. 3D seismic Inline (4456) showing the proposed Well TA17R location.
Figure 5. 3D seismic Crossline (42932) showing the proposed Well TA17R location.
Figure 6. Top-hole Prognosis Chart for the proposed Well TA17R location.

Sheet 1. Color Shaded Bathymetry Map
Sheet 2. Seafloor Gradient Map
Sheet 3. Side Scan Sonar Mosaic Map
Sheet 4. Seafloor Amplitude Map
Sheet 5. Hazards Map

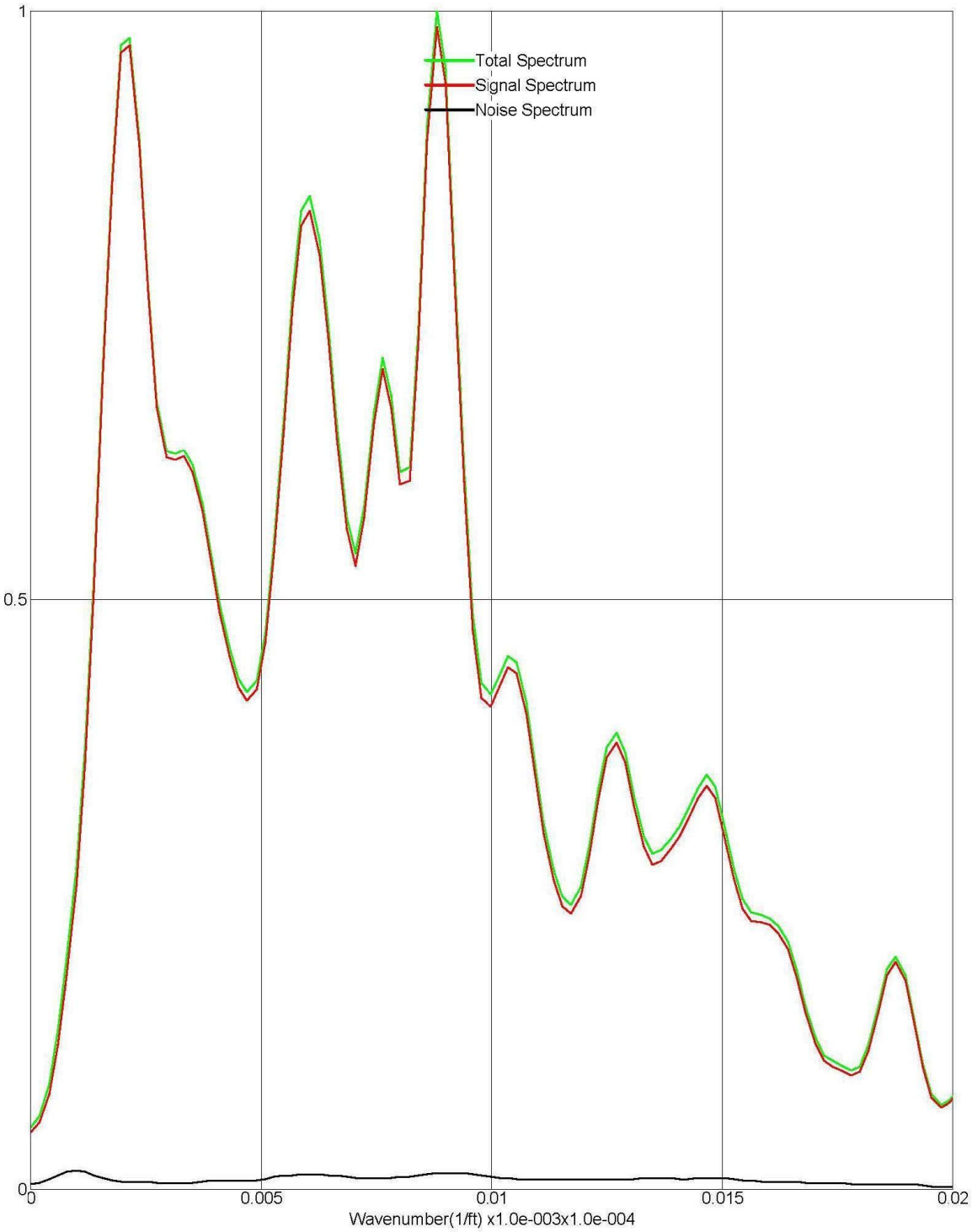
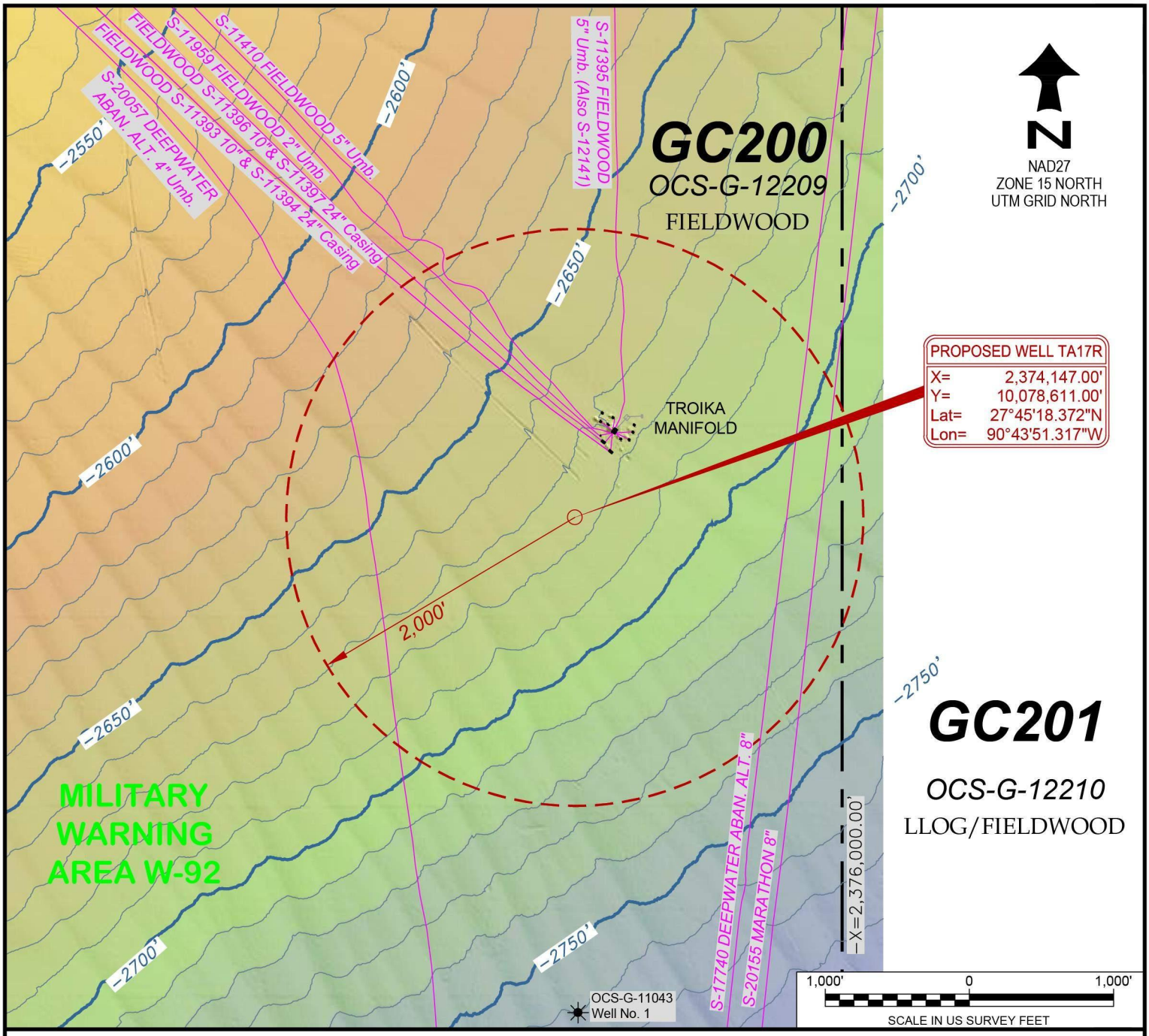


Figure 1. Computed frequency at the proposed Well TA17R location.



Multibeam Processing Sequence

- Water column velocity and density corrections applied
- Tide corrections applied using Goddard Ocean Tide Model GOT99.2
- Bin size = 3 meters (9.84 feet)
- Median filter applied
- Produced gridded-binned dataset using weighted-neighbor algorithm
- Search radius = 9 meters (29.53 feet)
- Contour interval = 10 feet
- Zero datum = Mean Sea Level

Color shaded image

Sun azimuth = 45°
Sun elevation = 30°

Shallower — Deeper

FIELDWOOD ENERGY

PROPOSED WELL TA17R

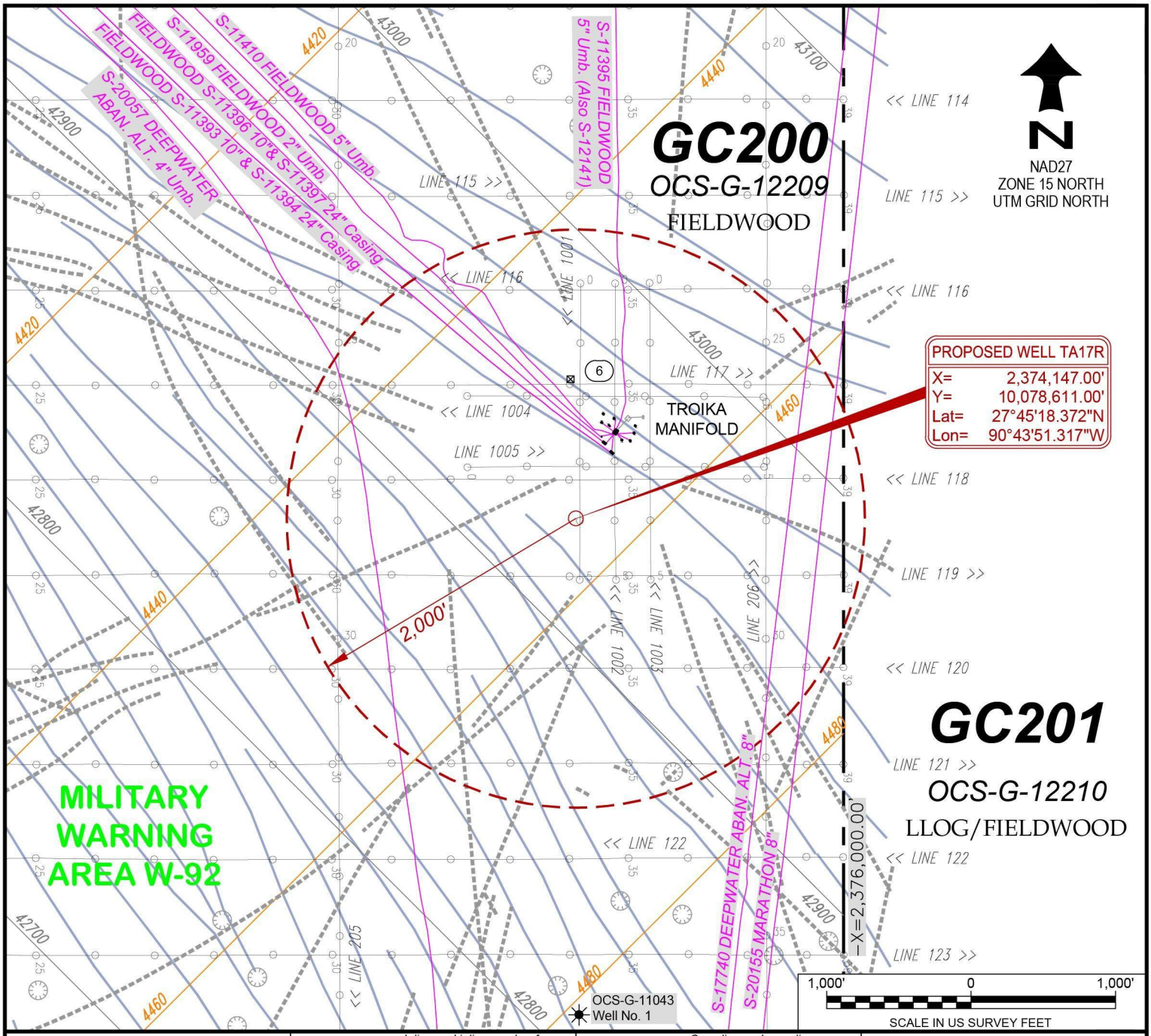
COLOR SHADED BATHYMETRY MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 1 of 5
DOC: 198253-OII-DRW-CLR-005-01		REV. 0



<< LINE 101 — Navigation trackline with name, direction run, fix, and fix number	4360 — Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)	42800 — Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4	⊠ 6 — Sonar contact & reference number
Drag scar	Depression (symbol does not reflect actual size)	Gully	

NOTE: 3D seismic data provided in depth from client.

SONAR CONTACTS

NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
6	12.3'x5.2'x0.0'	2,374,111'	10,079,575'

FIELDWOOD ENERGY

PROPOSED WELL TA17R
HAZARDS MAP
Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019	
CKD: D. Pierrottie	APP: C. Baker	SHEET 5 of 5	REV. 0
DOC: 198253-OII-DRW-CLR-005-05			

FIELDWOOD ENERGY

WELL SITE CLEARANCE LETTER

PROPOSED WELL TA18
BLOCK 200, GREEN CANYON AREA

OCEANEERING®

Oceaneering Document Number:	198253-OII-RPT-WCL-06	Survey Dates:	12-13 Feb, 2018 3 May – 8 Jun, 2008
Client Document Number:	N/A	Location:	GC200
Client:	Fieldwood Energy, LLC	Vessel:	M/V *Miss Ginger* M/V *Ocean Project*

REVISION HISTORY

Rev	Reason For Issue	Author	Reviewed	Approved	Rev Date
A	Client Review	H. Pantlik	J. Cox	C. Baker	21Mar2019
0	Final Issue	H. Pantlik	J. Cox	C. Baker	17Apr2019

Signature Box

Harris Pantlik
Geoscientist

FIELDWOOD ENERGY

Fieldwood Energy, LLC
2000 W Sam Houston Pkwy Suite 1200
Houston, TX 77042

ATTN: Mr. Eric Kubera

Well Site Clearance Letter
Proposed Well TA18
Block 200 (OCS-G-12209), Green Canyon Area

INTRODUCTION

Fieldwood Energy, LLC (Fieldwood) contracted Oceaneering International, Inc. (OII) to prepare a well site clearance letter for the proposed drilling location of Well TA18 in Block 200 (OCS-G-12209), Green Canyon Area (GC). The data used for the well site clearance letter is based on the interpretation of high-resolution Autonomous Underwater Vehicle (AUV) data collected by OII and an exploration-quality 3D seismic volume licensed by Fieldwood. OII completed an archaeological and geohazard assessment titled "*AUV/3D Seismic Shallow Hazard and Archaeological Report, Block 200 (OCS-G-12209), Green Canyon Area, Gulf of Mexico"* and archaeological, engineering and hazard assessment titled "*Archaeological, Engineering and Hazard Study, Two Proposed 8.625-inch Oil/Gas/Water Pipelines and a 4.4-inch Umbilical, From Block 244 to Block 65, Green Canyon A*rea". These assessments were submitted to Marathon Oil Company (Marathon) in October 2008, and to Fieldwood in March 2018. This well site clearance letter is based on the findings provided within those reports.

This letter provides a top-hole drilling prognosis and addresses seafloor conditions within a 2,000-foot radius of the proposed Well TA18 surface location. The depth limit of the investigation is approximately 5,700 feet below the seafloor (BSF). This assessment and enclosures presented with this letter comply with the U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) Notice To Lessees (NTL) No. 2008-G05 (Shallow Hazards Program), NTL No. 2005-G07 (Archaeology), and NTL No. 2009-G40 (Deepwater Benthic Communities).

WELL LOCATION

The coordinates and calls for the proposed Well TA18 surface location are tabulated below:

Table 1. Proposed Well TA18 Surface Location

Well	Easting (feet)	Northing (feet)	Latitude	Longitude	Calls From GC200	
TA18	2,374,455.71'	10,075,534.10'	27° 44' 47.859" N	90° 43' 48.514" W	1,544.29' FEL	1,294.10' FSL

The geodetic datum used for this project is the North American Datum of 1927 (NAD27) with the Clarke 1866 Ellipsoid. The datum is projected using the Universal Transverse Mercator (UTM), Zone 15 North (15N) with a central meridian at 93° 00'W, a false easting of 1,640,416.67 feet at the central meridian, and a false northing of 0.00 feet at 00° 00'N. All coordinates given are presented in this projection within this letter and on the maps (Sheets 1 through 5). All grid units, as well as scales and measurements, are in U.S. Survey Feet.

The proposed Well TA18 surface location and the 2,000-foot radius circle centered at the surface location are displayed on the Color Shaded Bathymetry Map (Sheet 1), Seafloor Gradient Map (Sheet 2), Side Scan Sonar Mosaic Map (Sheet 3), Seafloor Amplitude Map (Sheet 4), and Hazard Map (Sheet 5).

SURVEY METHODS

AUV Survey Data (2018)

The high-resolution AUV data were collected using OII's *O-Surveyor III* AUV on February 12 and 13, 2018. The AUV remote-sensing instruments include a Simrad EM 2040 Multibeam Echosounder (200 kHz), EdgeTech 2200-M Full Spectrum Chirp Side Scan Sonar (120/410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1.5 – 10.0 kHz). In general, the AUV survey grid pattern consisted of parallel east-west primary tracklines and parallel north-south tie lines. The primary trackline spacing was 200 meters (656.17 feet), and the tie lines were spaced at 900 meters (2,952.75 feet). The survey grid was designed to provide 100% coverage with the multibeam bathymetry system, 200% coverage (100% overlap) with the side scan sonar system, and a representative sampling with the subbottom profiler system.

AUV Survey Data (2008)

The high-resolution AUV data were collected using OII's *C-Surveyor III* AUV from May 3 to June 5, 2008. The AUV remote-sensing instruments include a Simrad EM 2000 Multibeam Echosounder (200 kHz), EdgeTech Dual Frequency (230 kHz dynamically focused and 410 kHz), and an EdgeTech DW106 Chirp Subbottom Profiler (1 – 6 kHz). From the 2008 survey, only Lines 101 – 104 (shot points 28 –35) were used for this assessment. The survey grid was designed to provide 100% coverage with the multibeam bathymetry system, 200% coverage (100% overlap) with the side scan sonar system, and a representative sampling with the subbottom profiler system.

3D Seismic Data

Fieldwood provided an exploration-quality 3D seismic data volume in SEG-Y format. Inlines and crosslines are depicted on the Hazards Map (Sheet 5). The 3D data were provided at a 2-millisecond sample rate and extend to the full depth of the study. The 3D seismic data is a zero phase wavelet and the seafloor reflector is represented by a strong positive amplitude peak flanked by troughs with absolute amplitude values of approximately one-half of the peak value. The 3D seismic data are in the depth domain and the computed spectrum is provided in Figure 1. The inlines of the data run southwest to northeast and are spaced at 30-meter (98.42-foot) intervals. The crosslines run southeast to northwest and are spaced at 25-meter (82.02-foot) intervals.

BATHYMETRY AND SEAFLOOR GRADIENTS

Bathymetry was processed using the AUV multibeam and is shown on the Color Shaded Bathymetry Map (Sheet 1) at 10-foot contour intervals. The bathymetry indicates the water depth at the proposed Well TA18 location is 2,758 feet Mean Seal Level (MSL). Within the 2,000-foot radius, the seafloor depth ranges from 2,696 feet MSL in the northwest to 2,818 feet MSL in the southeast (Sheet 1). At the proposed well, the bathymetry indicates the seafloor is benign and slopes to the southeast at an average gradient of 1.7°. Small seafloor irregularities in the area are observed as seafloor gullies, depressions, and drag scars. Within the 2,000-foot radius, the highest localized seafloor gradient measures 5° and occurs along a drag scar 1,060 feet north-northwest of the proposed well (Sheet 2).

SEAFLOOR SEDIMENTS AND HAZARDS

The side scan sonar images (Sheet 3; Figure 2) exhibit primarily low to moderate acoustic reflectivity. Additionally, the 3D seafloor amplitude image (Sheet 4) displays a range of low to moderate acoustic

amplitudes within the 2,000-foot radius and agrees well with the side scan sonar images. These low to moderate acoustic reflectivity and seafloor amplitudes indicate finely textured seafloor sediments likely comprised of hemipelagic clay (very soft silty clay).

The side scan sonar and multibeam images show numerous gullies and depressions on the seafloor (Sheet 5). The gullies exhibit widths between 30 and 120 feet and negative relief of up to 3 feet below the ambient seafloor. Localized seafloor gradients across these gullies range from 2° – 4° (Sheet 4). The subbottom profiler images suggest these gullies have occupied the same position for several thousand years (Figure 3). The subbottom profiler records do not show any lenses of sediment being deposited or transported in the gullies. Bottom currents may aid in transporting sediment along the gullies and presumed to be on the order of magnitude of a turbidity flow or current. The low sediment density of these types of flows should have no impact on drilling or development activities.

The depressions are potentially created by the vertical migration of fluids through fractures in unconsolidated to semi-consolidated sediments. Slower migration of fluids and gas are less capable of entraining large amounts of sediments and often result in the development of small seafloor features such as depressions. The subbottom profile records do not show any shallow gas accumulations associated with the depressions suggesting they are due to dewatering. The depressions average 6 feet in diameter and are less than one foot in depth. Drag scars also occur throughout the study area and are attributable to lease developments activities.

POTENTIAL DEEPWATER BENTHIC COMMUNITIES

High-amplitude seismic seafloor anomalies are a potential indicator of carbonates and benthic community habitats. The seafloor at the proposed Well TA18 location and surrounding 2,000-foot radius contains no high negative or positive amplitude anomalies associated with fluid expulsion or mounded carbonates representing potential benthic communities (Sheets 4 and 5). Additionally, the side scan sonar images and subbottom profiles show no evidence of hydrocarbon seepage within 2,000 feet of the proposed Well TA18 surface location (Sheet 5; Figures 2 and 3). Impact to potential deepwater benthic communities for the proposed Well TA18 is considered negligible.

MAN-MADE HAZARDS

A review of OII and the BOEM/BSEE databases shows 2 flowlines, 1 well, and 1 umbilical located within the 2,000-foot radius. The closest infrastructure is Well No. 1 (OCS-G-11043) located 460 south-southwest from the proposed Well TA18 surface location (Figure 2).

One unidentified sonar contact measuring 9.5 feet in length, 1.1 feet in width, with no measurable height is located 546 feet south of the proposed well. The locations, lengths, widths, and heights of the unidentified sonar contacts outside the 2,000 foot radius can be found on the Side Scan Sonar Mosaic Map (Sheet 3) and Hazards Map (Sheet 5). None of the unidentified sonar contacts within the study area are recommended for avoidance based on archaeological potential.

SUBSURFACE GEOHAZARDS AND STRATIGRAPHY

Within the study area, the AUV subbottom profiles provide high-resolution stratigraphy to a maximum depth of approximately 300 feet BSF. The subbottom profiler data exhibit continuous, sharp bottom echoes with parallel and continuous reflectors throughout the area. In general, these sediment deposits are characterized by interleaved moderate to low amplitude reflectors that represent cyclic deposition of hemipelagic clay and fine-grained turbidites.

Within the study area, 6 sedimentary units (Units A – F), each consisting of one or more distinctive sequences, were interpreted from the AUV and 3D seismic data to approximately 5,600 feet BSF, the lower limit of investigation. The seafloor and 6 horizons mark the top and/or base of each of the successive units (Figures 4 – 6).

Unit A (Seafloor to Horizon 1)

Unit A consists mostly of low amplitude, parallel, continuous reflectors and is 384 feet thick at the well location. Unit A occurs 2,758 – 3,142 feet BSL at the well location. Amplitudes and acoustic impedance contrasts are low and suggest the unit is comprised of mostly hemipelagic clay laid down as a drape deposit with some mass transport deposits near the base of the unit. No amplitude anomalies occur within Unit A.

Unit B (Horizon 1 to Horizon 2)

Unit B occurs from 3,142 – 3,291 feet BSL (384 – 533 feet BSF) at the proposed well location and consists of low amplitude, subparallel reflectors. The sediments in Unit B are interpreted as likely comprised of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit B.

Unit C (Horizon 2 to Horizon 3)

Unit C consists of variable amplitude, semi-continuous reflectors and occurs from 3,291 – 3,790 feet BSL (533 – 1,032 feet BSF). The unit is interpreted as hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites, mass movement deposits, and some sands. No amplitude anomalies occur within Unit C.

Unit D (Horizon 3 to Horizon 4)

Unit D is comprised of subparallel to chaotic, variable amplitude reflectors and occurs from 3,790 – 4,903 feet BSL (1,032 – 2,145 feet BSF). The upper portion of Unit D is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit D is interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit D in the 2,000 foot radius of the proposed well.

Unit E (Horizon 4 to Horizon 5)

Unit E consists of subparallel to chaotic, low to medium amplitude reflectors and occurs from 4,903 – 6,826 feet BSL (2,145 – 4,068 feet BSF). The sediments within the upper portion of Unit E are interpreted as sediments of hemipelagic clay, laid down as a drape deposit and interbedded with fine-grained turbidites. The middle portion of Unit E is channel fills with sandy interbeds. The lower portion of Unit E is interpreted as draped deposits that are interbedded with fine-grained turbidites, mass movement deposits, and channel fills with sandy interbeds. No amplitude anomalies are located within 2,000 feet of the proposed Well TA18.

Unit F (Horizon 5 to Horizon 6)

Unit F occurs from 6,826 – 8,453 BSL (4,068 – 5,965 feet BSF) and consists of variable amplitude, subparallel to chaotic reflectors. The upper portion of Unit F is interpreted as mass transport deposits and channel fills with some sands. The lower portion of Unit F is interpreted as sediments of hemipelagic clay, laid down as a drape deposit, and interbedded with fine-grained turbidites. No amplitude anomalies occur within Unit F.

SHALLOW GAS

Anomalies of very high amplitude are interpreted as potential regions of fluid/gas saturation usually associated with porous sands. The risk of shallow gas is interpreted based on seismic amplitude levels with geologic settings taken into account. The gas risk is assessed as being at one of the following levels:

- **Negligible:** No amplitude anomalies or other gas indicators present.
- **Low risk of gas:** Generally indicated by increased amplitude (2 – 3 times background level) and phase reversal. This may also include diffuse areas of gas blanking.
- **Moderate risk of gas:** Generally indicated by high amplitude (3 – 4 times background level) and phase reversal.
- **High risk of gas:** Generally indicated by the highest amplitudes (in excess of 4 times background level), phase reversal, and a combination of other attributes indicative of the presence of gas, particularly velocity pull-down and masking of underlying sediments. Stratigraphic and structural settings may also be taken into account.

Units A – C exhibit a negligible risk of gas. Units D – F all exhibit a low risk of shallow gas. The well bore path does not penetrate a high-amplitude anomaly (Figures 3 – 5). There is no indication of BSRs within the study area.

SHALLOW WATER FLOW

Sands with shallow water flow (SWF) potential often lie below a seal that prevents dewatering and compaction after deposition and form in unconsolidated and overpressured sands. The pressure rises with overburden causing a potentially hazardous condition for drilling operations. Some SWF intervals have proven difficult or impossible to detect on seismic profiles. Several factors may contribute to SWF including high porosity and permeability, sand-prone aquifer, mechanism to pressurize, and seal. Additional details are described below:

- **Water depth and depth of burial:** Significant water depths (> 500 feet below sea level) are required for the overpressure to occur. The seal must be deeply buried (> 500 feet below the seafloor) to become sufficiently strong.
- **High deposition rates:** Sedimentation rate needs to be greater than 1,500 feet/myr to effectively seal in sands. Sedimentation rates are expected to be high within a salt withdrawal basin. Rapid burial leads to pressure disequilibrium. In addition, if these sediment 'packets' were formed through a sequence of turbidites or gravity flow, there is an increased likelihood of water saturation and overpressure (pore pressure rapidly increased and sealed by an impervious layer).
- **Suitably porous sediments:** The sediment packets comprising the risk of shallow water flow are believed to contain clastic material and are thus porous.
- **Impermeable seal:** The overlying sediments are comprised of a clay facies.

All of these factors occur within the study area. Since there is presently no method for quantifying the risk of SWF, caution is recommended when drilling through units with SWF potential. Sands with SWF potential often occur in unconsolidated, overpressured sands that lie below a seal. This seal prevents dewatering and compaction after deposition. The pressure rises with overburden causing a potentially disastrous hazard for drilling operations.

Nine wells currently exist within GC200. According to information listed on the BOEM and BSEE website, two of these nine wells experienced a SWF event, both reported at 1,266 feet BSF (TA-5 and Well No. 1). Both SWF events were categorized as low severity flows and well integrity was maintained.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Unit C – E. Due to the unpredictable nature of SWF, it is advised that caution be executed for any drilling operations through these sediments.

GAS HYDRATES

Gas hydrates are an ice crystalline form of gas hydrocarbons in deepwater marine environments where the conditions of pressure and temperature are favorable. The hydrate stability zone is the depth interval between the seafloor and the point where the hydrate is no longer stable in form. The thermal gradient of the seabed soils determines the depth of the hydrate stability zone base. The acoustic impedance contrast caused by the hydrate and free gas trapped at the base of the hydrate stability zone forms a bottom simulating reflector (BSR) on seismic profiles. Bottom simulating reflectors often cross cut the normal seismic stratigraphy, much like a bottom multiple.

The areas where seafloor gas hydrates accumulate in the near-surface sediments of the Gulf of Mexico are generally unfavorable sites for drilling operations. Irregular seafloor topography, gas seeps, gas chimneys, seafloor hydrates and benthic communities may all be found in close association. There was no indication of gas hydrates, associated geologic feature, or any obvious BSRs near the proposed well.

CONCLUSIONS

The proposed Well TA18 surface location has a water depth of 2,758 feet MSL. The seafloor at the proposed well slopes southeast at a gradient of 1.7°.

Geologic features observed in the 2,000-foot radius include seafloor gullies, depressions, and drag scars.

No high acoustic reflectivity (side scan sonar) or seafloor amplitude anomalies (3D seismic) indicating the occurrence of hardgrounds, carbonates, benthic communities, or potential expulsions, are found within 2,000 feet of the proposed Well TA18 location.

Unidentified sonar contact No. 9 is located within the 2,000 foot radius of the proposed Well TA18. The unidentified sonar contact is not recommended for avoidance based on archaeological potential.

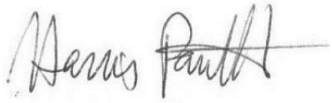
Two flowlines, 1 existing well, and 1 umbilical is located within the 2,000-foot radius of the proposed Well TA18.

The assessment of seismic profiles suggests stratigraphic units at the proposed Well TA10 drill site exhibit a negligible risk of gas in Units A – C, and a low risk of gas in Units D – F.

SWF potential is considered negligible in Units A – B and low in Unit F. Due to the presence of channel fills below seals, SWF is considered low to moderate in Unit C – E.

Thank you for this opportunity to be of service. Please contact us if you have any questions concerning this assessment.

Sincerely,



Harris Pantlik
Geoscientist

ENCLOSURES

Figure 1. Computed frequency at the proposed Well TA18 location.
Figure 2. Side scan sonar image (Line 123) showing the proposed Well TA18 location.
Figure 3. Subbottom profile record (Line 123) showing the proposed Well TA18 location.
Figure 4. 3D seismic Inline (4480) showing the proposed Well TA18 location.
Figure 5. 3D seismic Crossline (42836) showing the proposed Well TA18 location.
Figure 6. Top-hole Prognosis Chart for the proposed Well TA18 location.

Sheet 1. Color Shaded Bathymetry Map
Sheet 2. Seafloor Gradient Map
Sheet 3. Side Scan Sonar Mosaic Map
Sheet 4. Seafloor Amplitude Map
Sheet 5. Hazards Map

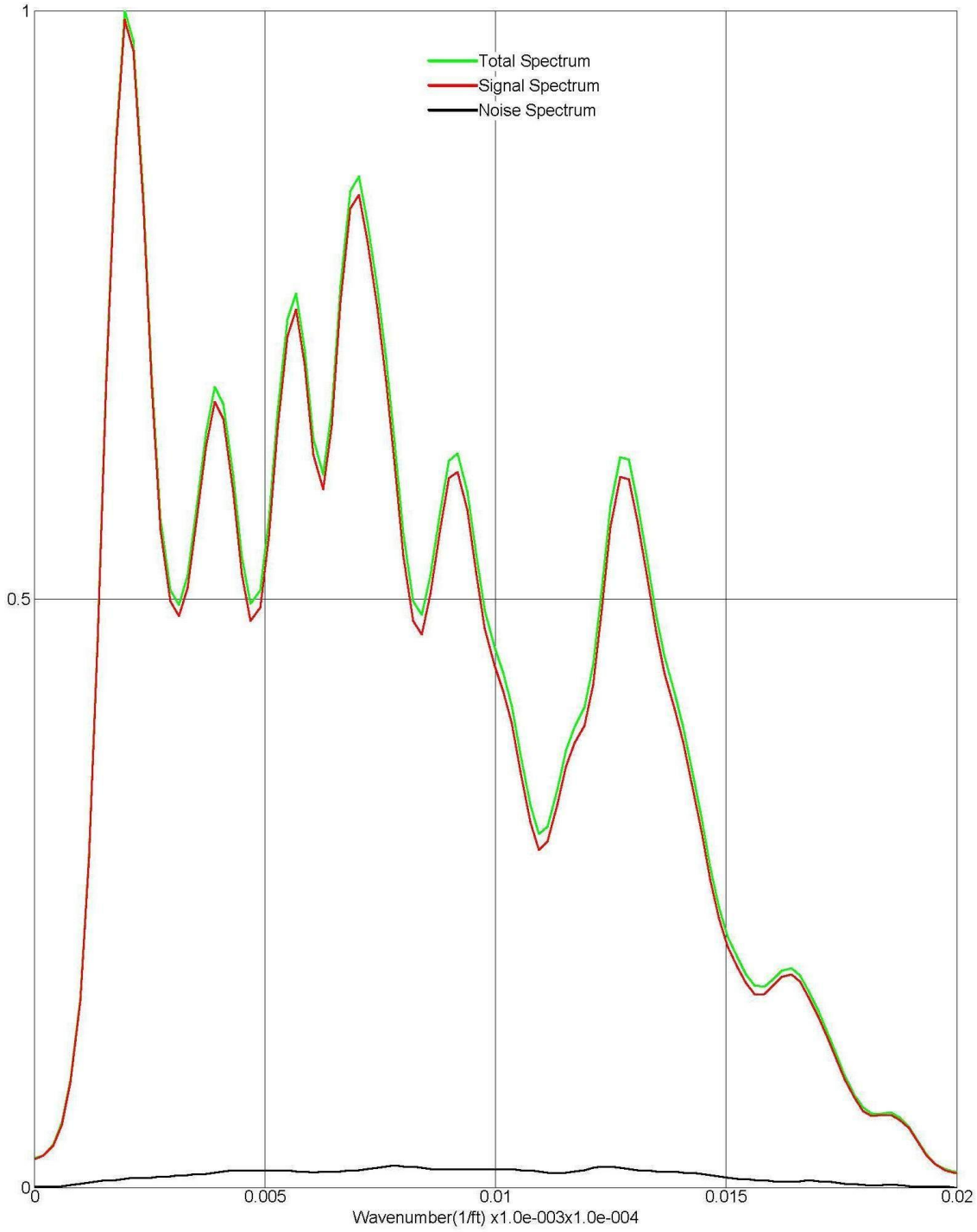
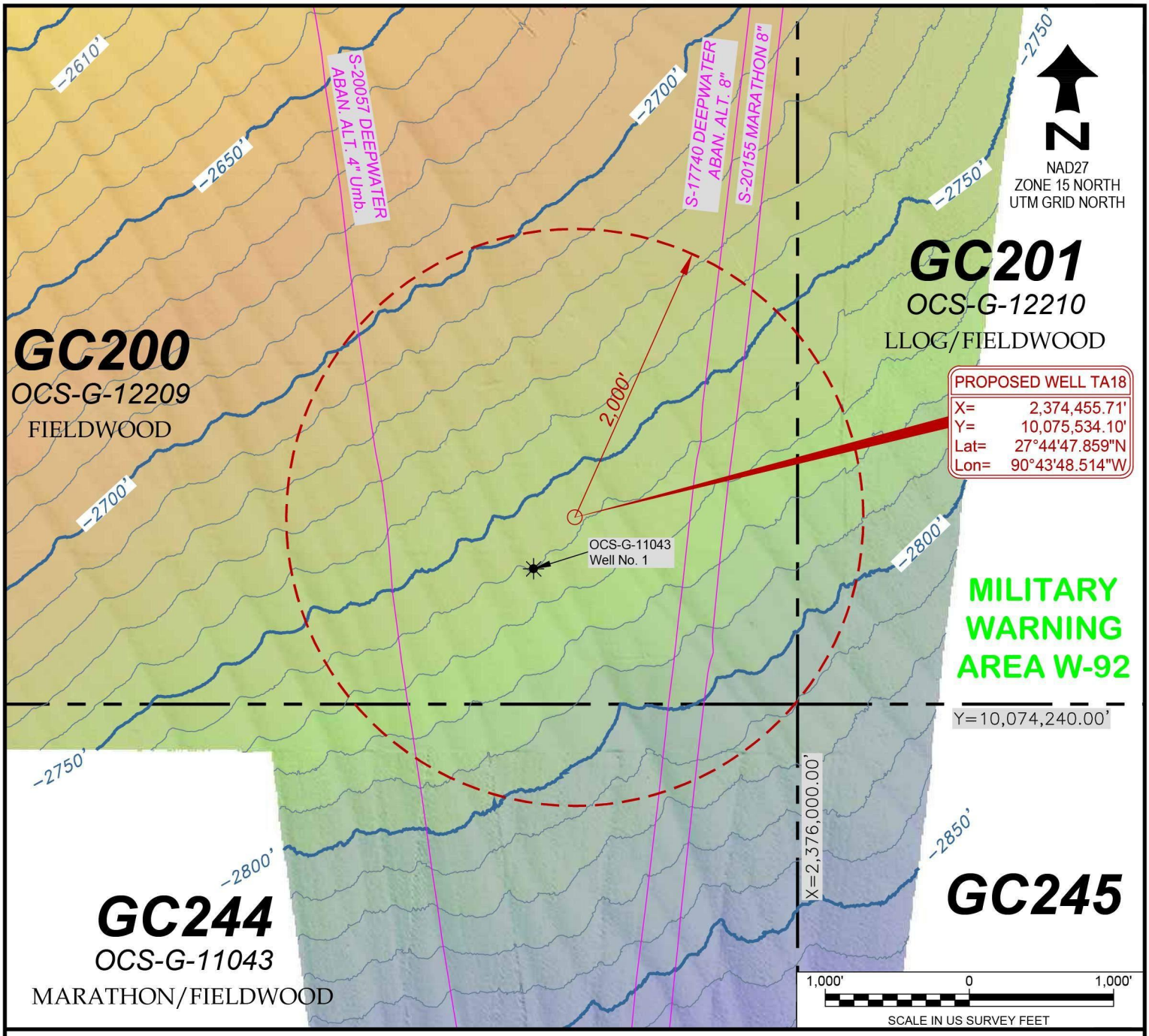


Figure 1. Computed frequency at the proposed Well TA18 location.



Multibeam Processing Sequence

- Water column velocity and density corrections applied
- Tide corrections applied using Goddard Ocean Tide Model GOT99.2
- Bin size = 3 meters (9.84 feet)
- Median filter applied
- Produced gridded-binned dataset using weighted-neighbor algorithm
- Search radius = 9 meters (29.53 feet)
- Contour interval = 10 feet
- Zero datum = Mean Sea Level

Color shaded image

Sun azimuth = 45°
Sun elevation = 30°

Shallower — Deeper

FIELDWOOD ENERGY

PROPOSED WELL TA18

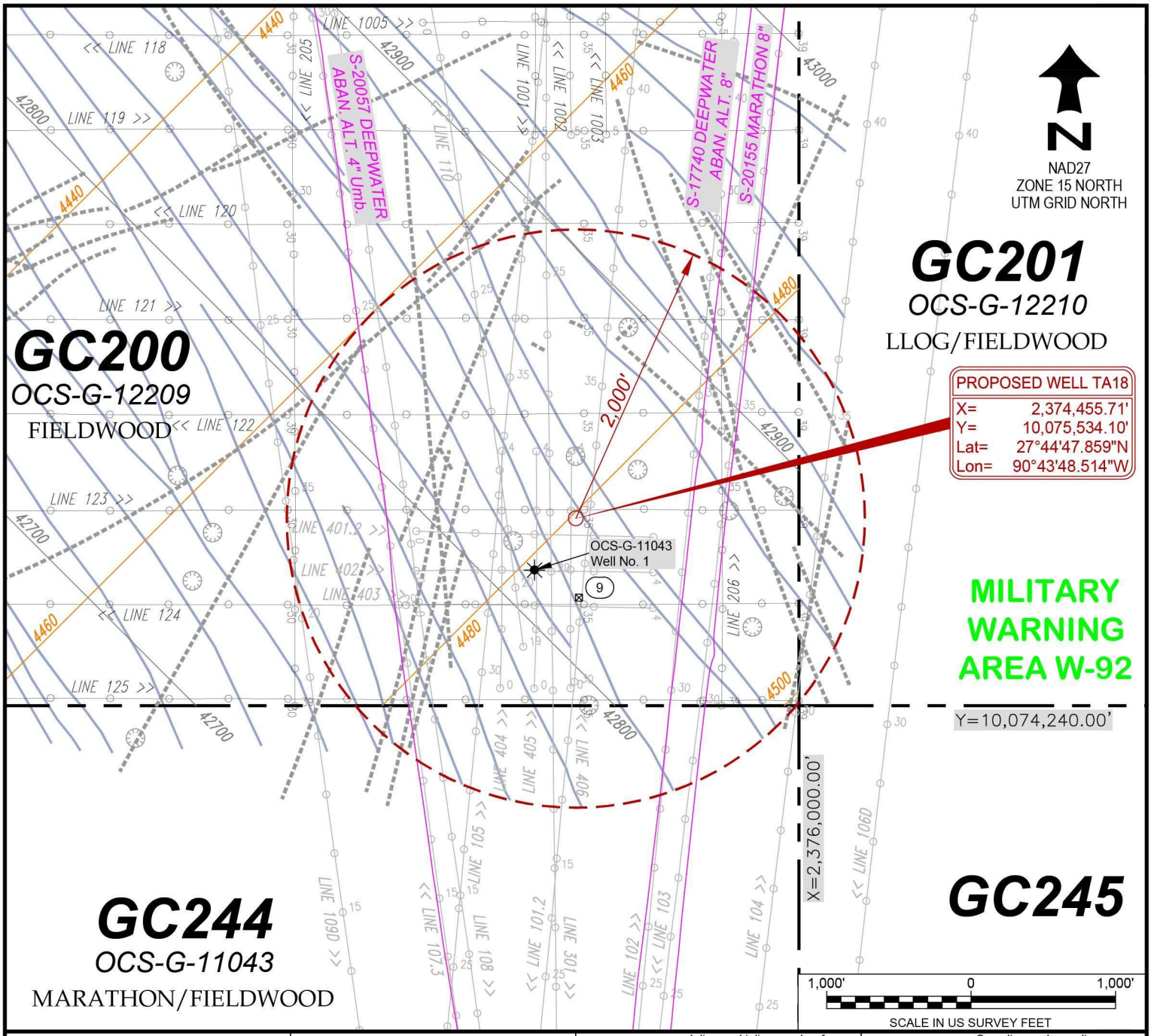
COLOR SHADED BATHYMETRY MAP

Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®

OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 1 of 5
DOC: 198253-OII-DRW-CLR-006-01		REV. 0



<< LINE 101 — Navigation trackline with name, direction run, fix, and fix number	<< LINE 101 — Navigation trackline with name, direction run, fix, and fix number (Job 083776)	4360 — Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)	42800 — Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4
⊠ (1) — Sonar contact & reference number	Drag scar	Depression (symbol does not reflect actual size)	Gully

NOTE: 3D seismic data provided in depth from client.

SONAR CONTACT

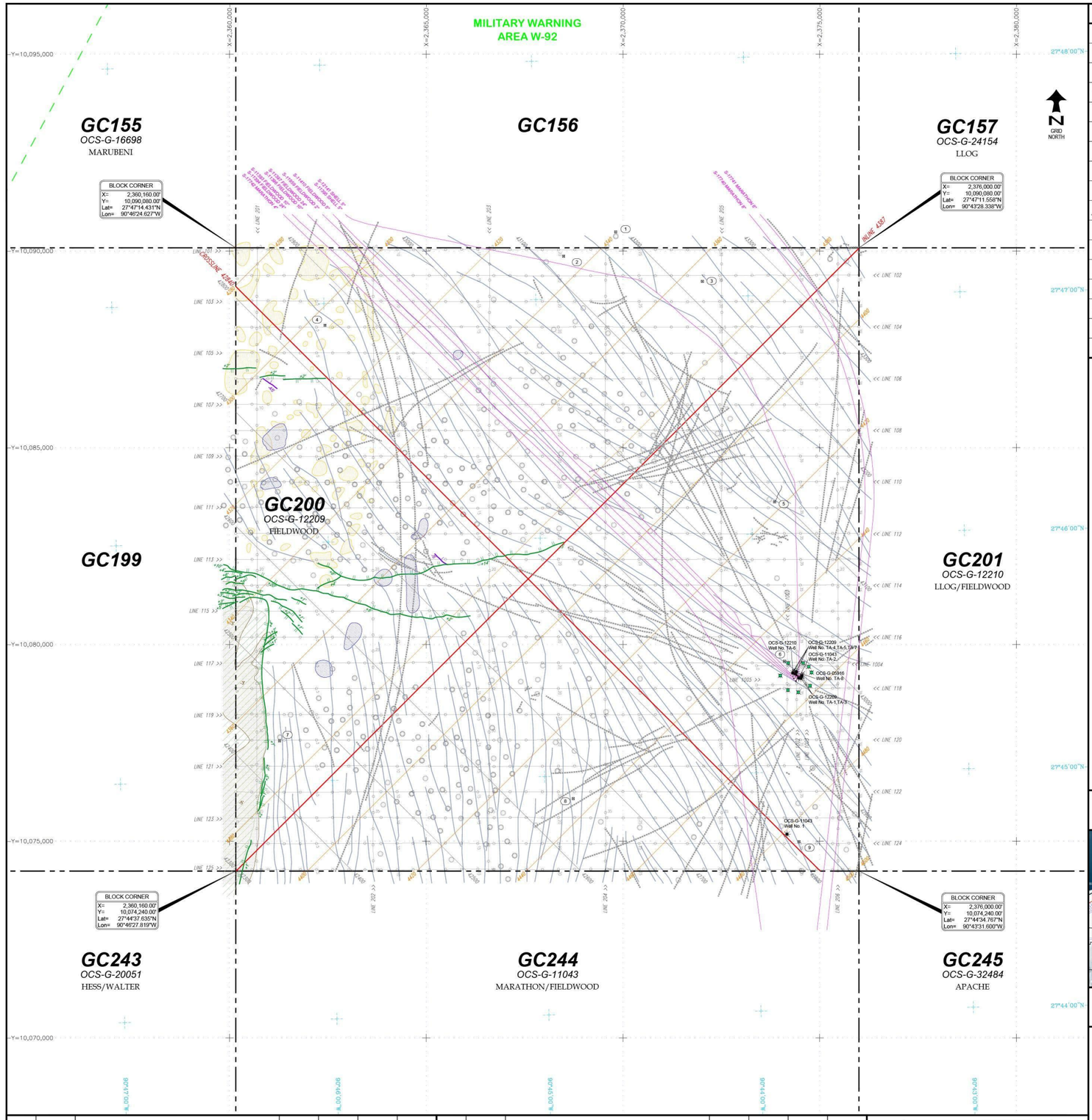
NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
9	9.5'x1.1'x0.0'	2,374,478'	10,074,987'

FIELDWOOD ENERGY

PROPOSED WELL TA18
HAZARDS MAP
Block 200, Green Canyon Area

PREPARED BY: OCEANEERING®
OCEANEERING INTERNATIONAL, INC.
730 E. KALISTE SALOOM RD.
LAFAYETTE, LA 70508
(337) 210-0000

JOB: 198253	DRW: A. Mayet	DATE: April 17, 2019
CKD: D. Pierrottie	APP: C. Baker	SHEET 5 of 5
DOC: 198253-OII-DRW-CLR-006-05		REV. 0



LEGEND

- Seafloor surface location of existing well
- Seafloor surface location of permanently abandoned well
- Transponder
- Existing pipeline, umbilical, or groundbed
- AUV navigation trackline with name, direction run, fix, and fix number
- Inline and inline number for 3D seismic data Spacing = 30 meters (98.42 feet)
- Crossline and crossline number for 3D seismic data Spacing = 25 meters (82.02 feet) Increment = 4
- Sonar contact and reference number
- Fault scarp with seafloor displacement (Hachures on downthrown side)
- Drag scar
- Scarp zone
- Depression (symbol does not reflect actual size)
- Gully
- Normal fault with depth of burial (Hachures on downthrown side)
- Mass movement with depth below seafloor
- Amplitude anomalies within Unit D (679' - 2,565' below seafloor)
- Amplitude anomalies within Unit E (1,628' - 4,753' below seafloor)

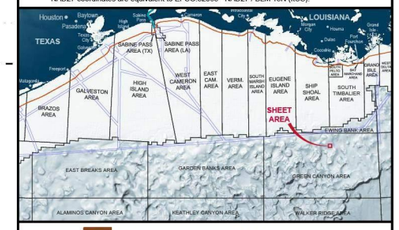
NOTE: 3D seismic data provided in depth from client.

SONAR CONTACTS

NUM.	DESCRIPTION	X COORDINATE	Y COORDINATE
1	26.5'x12.8'x0.0'	2,369,818'	10,090,484'
2	20.0'x13.4'x1.3'	2,368,493'	10,089,866'
3	3.3'x4.4'x0.0'	2,372,020'	10,089,228'
4	16.2'x7.6'x1.6'	2,362,427'	10,088,112'
5	482.4'x12.7'x0.0'	2,373,855'	10,083,624'
6	12.3'x5.2'x0.0'	2,374,111'	10,079,575'
7	14.1'x5.4'x0.2'	2,361,272'	10,077,548'
8	22.0'x8.6'x0.0'	2,368,738'	10,076,081'
9	9.5'x1.1'x0.0'	2,374,478'	10,074,987'

Attachment B-2
Page 1 of 2

NOTE: All field data acquired February 12-13, 2018.
Survey vessels: M/V *Ocean Project*, *O-Surveyor III*
3D seismic data was processed by CGG and provided by Fieldwood Energy.
NADCON version 2.1 utilized for WGS84-NAD27 conversions.
NAD27 coordinates are equivalent to EPSG:32065 - NAD27 / BLM 15N (ftUS).



FIELDWOOD ENERGY

AUV/3D SEISMIC SHALLOW HAZARD AND ARCHAEOLOGICAL REPORT

HAZARDS MAP

BLOCK 200 (OCS-G-12209)
GREEN CANYON AREA

1000 0 1000 2000
U.S. SURVEY FEET (1"=1000')

REV.	DATE	DESCRIPTION	DRAWN	INTERP	CHECKED	APPROVED
A	MAR. 16, 2018	PDF issue with report for client review	A. McBride	JDC, CRB, RC, HCP	ALM, BDP	
B	APR. 6, 2018	2nd PDF issue with report for client review	A. McBride	JDC, CRB, RC, HCP	D. Pierrottie	
0	APR. 13, 2018	Original issue with report	A. McBride	JDC, CRB, RC, HCP	D. Pierrottie	D. Pierrottie

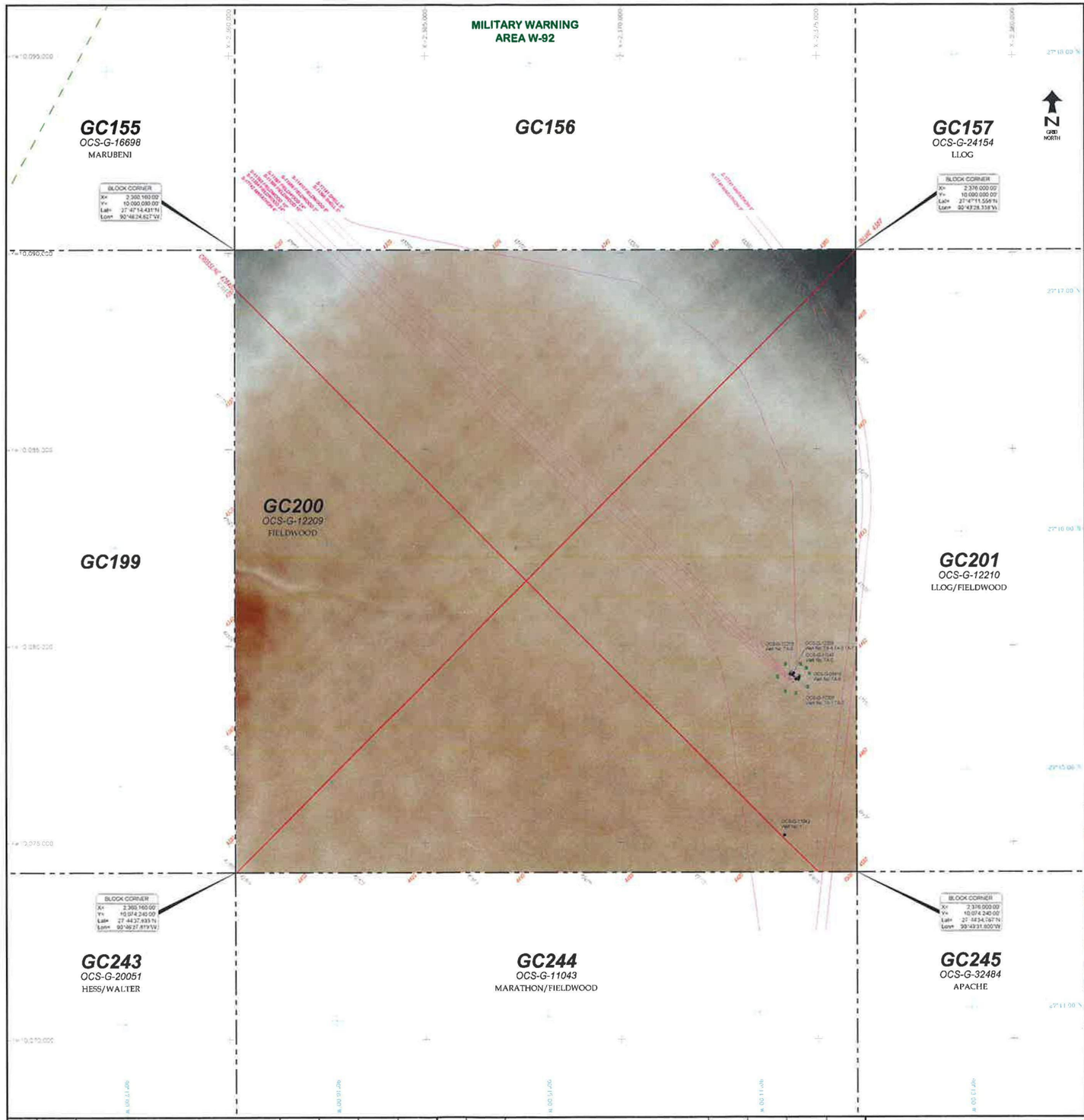
REV.	DATE	DESCRIPTION	DRAWN	INTERP	CHECKED	APPROVED

GEODETIC DATUM: NAD27
ELLIPSOID: CLARKE 1866
GRID UNITS: U.S. SURVEY FEET
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
ZONE: 15N
CENTRAL MERIDIAN: 93° 00' W
FALSE EASTING: 1,640,416.67 FEET at C.M.
FALSE NORTHING: 0.00 FEET at 00° 00' N

PREPARED BY:
OCEANEERING
OCEANEERING INTERNATIONAL, INC.
700 E. KALISTE SALOOM ROAD
LAFAYETTE, LA 70508
(337) 210-5500

JOB: 189363 DATE: APRIL 13, 2018
DOC: 189363-OII-DRW-BHZ-002-08
SHEET 8 of 12 REV 0

SIZE: 35.5" X 31" DATE: 04/13/2018 TIME: 14:34 FILENAME: Z:\189363\ACAD\189363-OII-DRW-BHZ-002.DWG



LEGEND

- Seafloor surface location of existing well
- Seafloor surface location of permanently abandoned well
- Transponder
- Existing pipeline, umbilical, or groundbed
- Military warning area and designation
- 4360 — Inline number for 3D seismic data; Spacing = 30 meters (98.42 feet)
- 12733 — Crossline number for 3D seismic data; Spacing = 25 meters (82.02 feet) Increment = 4

Amplitude

Attachment B-2
Page 2 of 2

NOTE: 3D seismic data was processed by CGG and provided by Fieldwood Energy
NADCON version 2.1 utilized for WGS84-NAD27 conversions
NAD27 coordinates are equivalent to EPSG 32065 - NAD27 / BLM 15N (ftUS)

FIELDWOOD ENERGY

AUV/3D SEISMIC SHALLOW HAZARD AND ARCHAEOLOGICAL REPORT

SEAFLOOR AMPLITUDE MAP

BLOCK 200 (OCS-G-12209)
GREEN CANYON AREA

1000 0 1000 2000

REV	DATE	DESCRIPTION	DRAWN	INTERP	CHECKED	APPROVED
A	MAR 16 2018	PDF issue with report for client review	A. McBride	JCC, CRB, RC, HCT	ALM, BDP	
B	APR 6, 2018	2nd PDF issue with report for client review	A. McBride	JCC, CRB, RC, HCT	D. Perrotta	
0	APR 13 2018	Orginal issue with report	A. McBride	JCC, CRB, RC, HCT	D. Perrotta	D. Perrotta

REV	DATE	DESCRIPTION	DRAWN	INTERP	CHECKED	APPROVED

GEODETIC DATUM NAD27
ELLIPSOID CLARKE 1866
GRID UNITS U.S. SURVEY FEET
PROJECTION UNIVERSAL TRANSVERSE MERCATOR
ZONE 15N
CENTRAL MERIDIAN 93° 00' W
FALSE EASTING 1,640,416.67 FEET at C M
FALSE NORTHING 0.00 FEET at 00° 00' N

OCEANEERING

JOB 189363 DATE APRIL 13, 2018
DOC 189363-GII-DRW-SHZ-002-07
SHEET 7 of 12 REV 0

SECTION C
HYDROGEN SULFIDE INFORMATION

(a) Concentration

Fieldwood does not anticipate encountering any H2S during the operations proposed under this S-EP.

(b) Classification

In accordance with 30 CFR 250.490(c), Lease No. OCS-G12209 (Green Canyon Block 200) has been classified by BOEM as H2S absent under the following Plans submitted by Fieldwood:

Control No. S-7899 approved on September 21, 2018
Control No. R-6772 approved on November 19, 2018

(c) H2S Contingency Plan

Pursuant to NTL 2008-G04, a H2S Contingency Plan is not required.

SECTION D
BIOLOGICAL, PHYSICAL, AND SOCIOECONOMIC INFORMATION

(a) Deepwater Benthic Communities

The water depths in the study area exceed 300 meters (984 feet), the minimum depth for deepwater benthic community potential as outlined in NTL No. 2009-G40. NTL No. 2009-G40 states a separation distance of 250 feet for seafloor disturbances and 2000 feet for drill centers. The multibeam, side scan sonar, subbottom profiler data, and 3D seismic seafloor amplitudes were reviewed for high-density deepwater communities. The review of the data did not identify any potential high-density deepwater benthic communities or shallow gas accumulations within the study area. Therefore, impact to deepwater benthic communities during drilling and field development is considered negligible.

(b) Topographic Features Map

Activities proposed in this S-EP do not fall within 305 meters (1,000 feet) of the "no activity zone," therefore no map is required.

(c) Topographic Features Statement

All activities proposed under this EP will be conducted outside all Topographic Feature Protective Zones, therefore shunting of drill cuttings and drilling fluids is not required.

(d) Live Bottoms (Pinnacle Trend) Map

Green Canyon Block 200 is not located within 61 meters (200 feet) of any live-bottom (pinnacle trend) features.

(e) Live Bottoms (Low Relief) Map

Green Canyon Block 200 is not located within 100 feet of any live-bottom (low-relief) features.

(f) Potentially Sensitive Biological Features

Green Canyon Block 200 is not located within 30 meters (100 feet) of potentially sensitive biological features.

(g) Socioeconomic Study Reports

Pursuant to NTL 2008-G04 the proposed operations covered by this S-EP do not fall within Florida state waters, therefore Fieldwood is not required to provide additional information relating to socioeconomic data.

(h) Threatened and Endangered Species, Critical Habitat, and Marine Mammal Information
Under Section 7 of the Endangered Species Act (ESA) all federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat.

In accordance with 30 CFR 250, Subpart B, effective May 14, 2007, and further outlined in Notice to Lessees (NTL) 2008-G04, lessees/operators are required to address site-specific information on the presence of federally listed threatened or endangered species and critical habitat designated under the ESA and marine mammals protected under the Marine Mammal Protection Act (MMPA) in the area of proposes activities under this plan.

NOAA Fisheries currently lists the Sperm Whale, Leatherback Turtle, Green Turtle, Hawksbill Turtle, and the Kemp's Ridley Turtle as endangered and the Loggerhead Turtle and Gulf Sturgeon as threatened. Currently there are no designated critical habitats for the listed species in the Gulf of Mexico Outer Continental Shelf, however, it is possible that one or more of these species could be seen in the area of our operations.

SECTION E
WASTES AND DISCHARGES INFORMATION

(a) Projected Generated Wastes and (b) Projected Ocean Discharges

Please see Table 1 titled, "*Wastes you will generate, treat, and downhole dispose or discharge to the GOM*" enclosed under Section A of this plan.

(c) National Pollutant Discharge Elimination System (NPDES) permit

NPDES permit information is not required for this S-EP per NTL No. 2008-G04.

(d) Modeling report

A modeling report was not required.

(e) Projected cooling water intake

Cooling water intake information is not required for this S-EP per NTL No. 2008-G04.

SECTION F
AIR EMISSIONS INFORMATION

(a) Emissions Worksheets and Screening Questions

Enclosed in this section are the emissions worksheets prepared in accordance with 30 CFR 550.218 for the Rowan Resolute.

Screen Procedures for EPs	Yes	No
Is any calculated Complex Total (CT) Emission amount (tons) associated with your proposed exploration activities more than 90% of the amounts calculated using the following formulas: CT = $3400D^{2/3}$ for CO, and CT = 33.3D for the other air pollutants (where D = distance to shore in miles)?		X
Do your emission calculations include any emission reduction measures or modified emission factors?	X	
Are your proposed exploration activities located east of 87.5° W longitude?		X
Do you expect to encounter H_2S at concentrations greater than 20 parts per million (ppm)?		X
Do you propose to flare or vent natural gas for more than 48 continuous hours from any proposed well?		X
Do you propose to burn produced hydrocarbon liquids?		X

Contact Information			
Description	**Name**	**Email Address**	**Telephone Number**
Preparer	Marla Begnaud	marla.begnaud@fwellc.com	337-354-8039
Secondary	Ali Ferguson	ali.ferguson@fwellc.com	713-969-1308

(b) Emission reductions measures

For diesel-fired prime movers, BOEM's default AQR (Air Quality Review) emission factors are based on AP 42 Vol II, Table II-3-3.

For the above referenced project, a reduced NOx emission factor was used for the diesel-fired prime movers.

Equipment/Emission Factors	units	PM	SOx	NOx	VOC	CO	REF.	DATE
Diesel Recip. > 600 hp.	gms/hp-hr	0.32	0.1835	11	0.33	2.4	AP42 3.4-1	10/96
Diesel Recip. > 600 hp. (PRIME MOVER)	gms/hp-hr			1.79			IMO Annex VI - Tier III @ 720 RPM	

Rowan Companies provided a Record of Construction and Equipment as a Supplement to the International Air Pollution Prevention (IAPP) Certificate. For the Rowan Resolute ship, there are six (6) prime mover engines. Each engine has a power output of 8000 kW, which equates to 10,728 HP. The total for the six (6) prime mover engines is 64,368 HP. The engines meet the IMO (International Maritime Organization) Annex VI Tier III NOx emission limits. See below.

	Diesel Engines	HP
DRILLING	PRIME MOVER>600hp diesel	64368

	Engine #1	Engine #2	Engine #3	Engine #4	Engine #5	Engine #6	Engine #7	Engine #8	Engine #9	Engine #10	Engine #11	Engine #12
Manufacturer and model	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V						
Serial number	BA4872-1	BA4872-2	BA4872-3	BA4872-4	BA4872-5	BA4872-6						
Use	Main Generator Engine	Main Generator Engine	Main Generator Engine	Main Generator Engine	Main Generator Engine	Main Generator Engine						
Power output (kW)	8000	8000	8000	8000	8000	8000						
Rated speed (rpm)	720	720	720	720	720	720						
Date of installation (dd/mm/yyyy)	22/07/2014	22/07/2014	22/07/2014	22/07/2014	22/07/2014	22/07/2014						
Date of major conversion (dd/mm/yyyy) Reg. 13.2.2	-	-	-	-	-	-						
Date of major conversion (dd/mm/yyyy) Reg. 13.2.3	-	-	-	-	-	-						
Exempted by regulation 13.1.1.2	-	-	-	-	-	-						
Tier I Reg.13.3	-	-	-	-	-	-						
Tier II Reg.13.4	X	X	X	X	X	X						
Tier II Reg. 13.2.2 or 13.5.2	-	-	-	-	-	-						
Tier III Reg.13.5.1.1	X	X	X	X	X	X						
Approved method exists	-	-	-	-	-	-						
Approved method not commercially available	-	-	-	-	-	-						
Approved method installed	-	-	-	-	-	-						

The IMO Annex VI NOx Tier III control requirements are as follows:

Tier	Ship construction date on or after	Total weighted cycle emission limit (g/kWh) n = engine's rated speed (rpm)		
		n < 130	n = 130 - 1999	n ≥ 2000
I	1 January 2000	17.0	$45 \cdot n^{(-0.2)}$ e.g., 720 rpm – 12.1	9.8
II	1 January 2011	14.4	$44 \cdot n^{(-0.23)}$ e.g., 720 rpm – 9.7	7.7
III	1 January 2016	3.4	$9 \cdot n^{(-0.2)}$ e.g., 720 rpm – 2.4	2.0

Since each engine has a rated speed of 720 RPM, the Tier III NOx emission limit is 2.4 g/kWh (1.79 g/HP-hr).

Attached are the Rowan Resolute Record of Construction and Equipment and the IMO Annex VI NOx Control Requirements for reference.

Attachments

1) Air Emissions Worksheets (*Attachment F-1*)
2) Rowan Resolute Record of Equipment & NOx Control Requirements (*Attachment F-2*)

OMB Control No. 1010-0151
OMB Approval Expires: 06/30/2021

EXPLORATION PLAN (EP)
AIR QUALITY SCREENING CHECKLIST

COMPANY	Fieldwood Energy Offshore LLC
AREA	Green Canyon
BLOCK	200
LEASE	OCS-G12209
PLATFORM	
WELL	TA010, TA012, TA014, TA016, TA017, TA018
COMPANY CONTACT	Ali Ferguson
TELEPHONE NO.	713-969-1308
REMARKS	Drill, complete, and install subsea trees for 6 wells.

Attachment H-1

EMISSIONS FACTORS

Fuel Usage Conversion Factors	Natural Gas Turbines		Natural Gas Engines		Diesel Recip. Engine		REF.	DATE
	SCF/hp-hr	9.524	SCF/hp-hr	7.143	GAL/hp-hr	0.0483	AP42 3.2-1	4/76 & 8/84

Equipment/Emission Factors	units	PM	SOx	NOx	VOC	CO	REF.	DATE
NG Turbines	gms/hp-hr		0.00247	1.3	0.01	0.83	AP42 3.2-1& 3.1-1	10/96
NG 2-cycle lean	gms/hp-hr		0.00185	10.9	0.43	1.5	AP42 3.2-1	10/96
NG 4-cycle lean	gms/hp-hr		0.00185	11.8	0.72	1.6	AP42 3.2-1	10/96
NG 4-cycle rich	gms/hp-hr		0.00185	10	0.14	8.6	AP42 3.2-1	10/96
Diesel Recip. < 600 hp.	gms/hp-hr	1	0.1835	14	1.12	3.03	AP42 3.3-1	10/96
Diesel Recip. > 600 hp.	gms/hp-hr	0.32	0.1835	11	0.33	2.4	AP42 3.4-1	10/96
Diesel Recip. > 600 hp. (PRIME MOVER)	gms/hp-hr			1.79			IMO Annex VI - Tier III @ 720 RPM	
Diesel Boiler	lbs/bbl	0.084	0.3025	0.84	0.008	0.21	AP42 1.3-12,14	9/98
NG Heaters/Boilers/Burners	lbs/mmscf	7.6	0.593	100	5.5	84	AP42 1.4-1, 14-2, & 14-3	7/98
NG Flares	lbs/mmscf		0.593	71.4	60.3	388.5	AP42 11.5-1	9/91
Liquid Flaring	lbs/bbl	0.42	6.83	2	0.01	0.21	AP42 1.3-1 & 1.3-3	9/98
Tank Vapors	lbs/bbl				0.03		E&P Forum	1/93
Fugitives	lbs/hr/comp.				0.0005		API Study	12/93
Glycol Dehydrator Vent	lbs/mmscf				6.6		La. DEQ	1991
Gas Venting	lbs/scf				0.0034			

Sulphur Content Source	Value	Units
Fuel Gas	3.33	ppm
Diesel Fuel	0.05	% weight
Produced Gas(Flares)	3.33	ppm
Produced Oil (Liquid Flaring)	1	% weight

EMISSIONS CALCULATIONS 1ST YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL	CONTACT	PHONE	REMARKS
Fieldwood Energy Offshore LLC	Green Canyon	200	OCS-G12209		TA010, TA012, TA014, TA016, TA017, TA018	Ali Ferguson	713-969-1308	Drill, complete, and install subsea trees for 6 wells.

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	64368	3108.9744	74615.39	24	120	45.37	26.02	253.74	46.79	340.27	65.33	37.46	365.39	67.37	489.99
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	2065	99.7395	2393.75	10	51	1.46	0.83	50.03	1.50	10.92	0.37	0.21	12.87	0.39	2.81
	VESSELS>600hp diesel(supply)	2065	99.7395	2393.75	10	51	1.46	0.83	50.03	1.50	10.92	0.37	0.21	12.87	0.39	2.81
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2020 YEAR TOTAL							**48.28**	**27.69**	**353.81**	**49.79**	**362.10**	**66.08**	**37.89**	**391.12**	**68.15**	**495.60**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES** 88.0											**2930.40**	**2930.40**	**2930.40**	**2930.40**	**67266.79**

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL	CONTACT	PHONE	REMARKS
Fieldwood Energy Offshore LLC	Green Canyon	200	OCS-G12209		TA010, TA012, TA014, TA016, TA017, TA018	Ali Ferguson	713-969-1308	Drill, complete, and install subsea trees for 6 wells.

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	64368	3108.9744	74615.39	24	120	45.37	26.02	253.74	46.79	340.27	65.33	37.46	365.39	67.37	489.99
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	2065	99.7395	2393.75	10	51	1.46	0.83	50.03	1.50	10.92	0.37	0.21	12.87	0.39	2.81
	VESSELS>600hp diesel(supply)	2065	99.7395	2393.75	10	51	1.46	0.83	50.03	1.50	10.92	0.37	0.21	12.87	0.39	2.81
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2021 YEAR TOTAL							**48.28**	**27.69**	**353.81**	**49.79**	**362.10**	**66.08**	**37.89**	**391.12**	**68.15**	**495.60**
EXEMPTION CALCULATION	**DISTANCE FROM LAND IN MILES**											**2930.40**	**2930.40**	**2930.40**	**2930.40**	**67266.79**
	88.0															

EMISSIONS CALCULATIONS 3RD YEAR

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL	CONTACT	PHONE	REMARKS
Fieldwood Energy Offshore LLC	Green Canyon	200	OCS-G12209		TA010, TA012, TA014, TA016, TA017, TA018	Ali Ferguson	713-969-1308	Drill, complete, and install subsea trees for 6 wells.

OPERATIONS	EQUIPMENT	RATING	MAX. FUEL	ACT. FUEL	RUN TIME		MAXIMUM POUNDS PER HOUR					ESTIMATED TONS				
	Diesel Engines	HP	GAL/HR	GAL/D												
	Nat. Gas Engines	HP	SCF/HR	SCF/D												
	Burners	MMBTU/HR	SCF/HR	SCF/D	HR/D	D/YR	PM	SOx	NOx	VOC	CO	PM	SOx	NOx	VOC	CO
DRILLING	PRIME MOVER>600hp diesel	64368	3108.9744	74615.39	24	120	45.37	26.02	253.74	46.79	340.27	65.33	37.46	365.39	67.37	489.99
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PRIME MOVER>600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BURNER diesel	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AUXILIARY EQUIP<600hp diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	2065	99.7395	2393.75	10	51	1.46	0.83	50.03	1.50	10.92	0.37	0.21	12.87	0.39	2.81
	VESSELS>600hp diesel(supply)	2065	99.7395	2393.75	10	51	1.46	0.83	50.03	1.50	10.92	0.37	0.21	12.87	0.39	2.81
	VESSELS>600hp diesel(tugs)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FACILITY INSTALLATION	DERRICK BARGE diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MATERIAL TUG diesel	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(crew)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	VESSELS>600hp diesel(supply)	0	0	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MISC.	BPD	SCF/HR	COUNT												
	TANK-	0			0	0				0.00					0.00	
DRILLING WELL TEST	OIL BURN	0			0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	GAS FLARE		0		0	0		0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
2022	YEAR TOTAL						48.28	27.69	353.81	49.79	362.10	66.08	37.89	391.12	68.15	495.60
EXEMPTION CALCULATION	DISTANCE FROM LAND IN MILES											2930.40	2930.40	2930.40	2930.40	67266.79
	88.0															

SUMMARY

COMPANY	AREA	BLOCK	LEASE	PLATFORM	WELL
Fieldwood Energy Offshore LLC	Green Canyon	200	OCS-G12209		TA010, TA012, TA014, TA016, TA017, TA018

Year	Emitted Substance				
	PM	SOx	NOx	VOC	CO
2020	66.08	37.89	391.12	68.15	495.60
2021	66.08	37.89	391.12	68.15	495.60
2022	66.08	37.89	391.12	68.15	495.60
Allowable	2930.40	2930.40	2930.40	2930.40	67266.79

SUPPLEMENT TO
INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE
(IAPP CERTIFICATE)

RECORD OF CONSTRUCTION AND EQUIPMENT

Notes:

1. This Record shall be permanently attached to the IAPP Certificate. The IAPP Certificate shall be available on board the ship at all times.
2. The Record shall be at least in English, French or Spanish. If an official language of the issuing country is also used, this shall prevail in case of a dispute or discrepancy.
3. Entries in boxes shall be made by inserting either a cross (x) for the answer "yes" and "applicable" or a (-) for *the answers "no" and "not applicable" as appropriate.*
4. Unless otherwise stated, regulations mentioned in this Record refer to regulations of Annex VI of the Convention and resolutions or circulars refer to those adopted by the International Maritime Organization.

1 Particulars of ship

1.1 Name of ship: **ROWAN RESOLUTE**

1.2 IMO number: **9630078**

1.3 Date on which keel was laid or ship was at a similar stage of construction: **21 May 2013**

1.4 Length (L)* metres: **N/A**

* Completed only in respect of ships constructed on or after 1 January 2016 that are specially designed, and used solely, for recreational purposes and to which, in accordance with regulation 13.5.2.1, the NO_x emission limit as given by regulation 13.5.1.1 will not apply.

2 Control of emissions from ships

2.1 *Ozone-depleting substances* (regulation 12)

2.1.1 *The following fire-extinguishing systems, other systems and equipment containing ozone-depleting* substances, other than hydrochlorofluorocarbons (HCFCs), installed before 19 May 2005 may continue in service:

System or Equipment	Location on board	Substance
-	-	-

2.1.2 The following systems containing hydrochlorofluorocarbons (HCFCs) installed before 1 January 2020 may continue in service:

System or Equipment	Location on board	Substance
-	-	-

2.2 *Nitrogen oxides (NO_x)* (regulation 13)

2.2.1 The following marine diesel engines installed on this ship comply with the applicable emission limit of regulation 13 in accordance with the revised NO_x Technical Code 2008:

	Engine #1	Engine #2	Engine #3	Engine #4	Engine #5	Engine #6	Engine #7	Engine #8	Engine #9	Engine #10	Engine #11	Engine #12
Manufacturer and model	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V	Hyundai-HiMSEN 16H32/40V						
Serial number	BA4872-1	BA4872-2	BA4872-3	BA4872-4	BA4872-5	BA4872-6						
Use	Main Generator Engine	Main Generator Engine	Main Generator Engine	Main Generator Engine	Main Generator Engine	Main Generator Engine						
Power output (kW)	8000	8000	8000	8000	8000	8000						
Rated speed (rpm)	720	720	720	720	720	720						
Date of installation (dd/mm/yyyy)	22/07/2014	22/07/2014	22/07/2014	22/07/2014	22/07/2014	22/07/2014						
Date of major conversion (dd/mm/yyyy) **Reg. 13.2.2**	-	-	-	-	-	-						
Date of major conversion (dd/mm/yyyy) **Reg. 13.2.3**	-	-	-	-	-	-						
Exempted by regulation 13.1.1.2	-	-	-	-	-	-						
Tier I Reg.13.3	-	-	-	-	-	-						
Tier II Reg.13.4	X	X	X	X	X	X						
Tier II Reg. 13.2.2 or 13.5.2	-	-	-	-	-	-						
Tier III Reg.13.5.1.1	X	X	X	X	X	X						
Approved method exists	-	-	-	-	-	-						
Approved method not commercially available	-	-	-	-	-	-						
Approved method installed	-	-	-	-	-	-						

2.3 *Sulphur oxides (SO_x) and particulate matter* (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

- 4.50% m/m (not applicable on or after 1 January 2012); or -
- 3.50% m/m (not applicable on or after 1 January 2020); or X
- 0.50% m/m, and/or X

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SO_x emission reductions as compared *to using a fuel oil with a sulphur content limit value of:*

- 4.50% m/m (not applicable on or after 1 January 2012) -
- 3.50% m/m (not applicable on or after 1 January 2020) -
- 0.50% m/m -

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

- 1.00% m/m (not applicable on or after 1 January 2015); or X
- 0.10% m/m, and/or X

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SO_x emission reductions as compared to using a fuel oil with a sulphur content limit value of:

- 1.00% m/m (not applicable on or after 1 January 2015) -
- 0.10% m/m -

2.4 *Volatile organic compounds (VOCs)* (regulation 15)

2.4.1 *The tanker has a vapour collection system installed and approved in accordance with* MSC/Circ.585 -

2.4.2.1 For a tanker carrying crude oil, there is an approved VOC Management Plan -

2.4.2.2 *VOC Management Plan approval reference:* -

2.5 *Shipboard incineration* (regulation 16)

2.5.1 The ship has an incinerator:

.1 installed on or after 1 January 2000 which complies with resolution MEPC.76(40), *as amended* -

.2 installed before 1 January 2000 which complies with:

- resolution MEPC.59(33) -
- resolution MEPC.76(40) -

2.6 *Equivalents (*regulation 4)

The ship has been allowed to use the following fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance methods used as an alternative to that required by this Annex:

System or Equipment	Equivalent Used	Approval Reference
SCR fitted to Engines No. 1,2,3,4,5 and 6 with serial no. BA4872-1, BA4872-2, BA4872-3, BA4872-4, BA4872-5, BA4872-6	Emission of Nitrogen Oxides (NOx) in accordance with Regulation 13.5.1.1 (Tier III)	Refer to the Technical Manual

THIS IS TO CERTIFY that this Record is correct in all respects.

Issued at Ulsan, Korea on 22 July 2014

(Place of issue) *(Date of issue)*

ABS

Breedlove, Tyson Ross, Ulsan Port

(Surveyor, American Bureau of Shipping)

ABS ULSAN

Maritime Safety
Maritime Security and Piracy
Marine Environment
Pollution Prevention
Oil Pollution
Chemical Pollution
Sewage
Garbage
Air Pollution and GHG Emissions
Pollution Preparedness and Response
Ballast Water Management
Biofouling
Anti-fouling Systems
Ship Recycling
Port Reception Facilities
Special Areas Under MARPOL
Particularly Sensitive Sea Areas
London Convention and Protocol
GESAMP
Major Projects
Technical Assistance
Legal Affairs
Human Element
Facilitation
Member State Audit Scheme & Implementation Support
Technical Cooperation
Conferences

Nitrogen Oxides (NOx) – Regulation 13

The control of diesel engine NO_x emissions is achieved through the survey and certification requirements leading to the issue of an Engine International Air Pollution Prevention (EIAPP) Certificate and the subsequent demonstration of in service compliance in accordance with the requirements of the mandatory, regulations 13.8 and 5.3.2 respectively, NOx Technical Code 2008 (resolution MEPC.177(58) as amended by resolution MEPC.251.(66)).

The NO_x control requirements of Annex VI apply to installed marine diesel engine of over 130 kW output power other than those used solely for emergency purposes irrespective of the tonnage of the ship onto which such engines are installed. Definitions of 'installed' and 'marine diesel engine' are given in regulations 2.12 and 2.14 respectively. Different levels (Tiers) of control apply based on the ship construction date, a term defined in regulations 2.19 and hence 2.2, and within any particular Tier the actual limit value is determined from the engine's rated speed:

Tier	Ship construction date on or after	Total weighted cycle emission limit (g/kWh) n = engine's rated speed (rpm)		
		n < 130	n = 130 - 1999	n ≥ 2000
I	1 January 2000	17.0	$45 \cdot n^{(-0.2)}$ e.g., 720 rpm – 12.1	9.8
II	1 January 2011	14.4	$44 \cdot n^{(-0.23)}$ e.g., 720 rpm – 9.7	7.7
III	1 January 2016	3.4	$9 \cdot n^{(-0.2)}$ e.g., 720 rpm – 2.4	2.0

The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA) established to limit NOx emissions, outside such areas the Tier II controls apply. In accordance with regulation 13.5.2, certain small ships would not be required to install Tier III engines.

A marine diesel engine that is installed on a ship constructed on or after the following dates and operating in the following ECAs shall comply with the Tier III NOx standard:

.1 1 January 2016 and operating in the North American ECA and the United States Caribbean Sea ECA; or

.2 1 January 2021 and operating in the Baltic Sea ECA or the North Sea ECA.

Related Links

GISIS
(Registration required for public users)

The emission value for a diesel engine is to be determined in accordance with the NO_x Technical Code 2008 in the case of Tier II and Tier III limits. Most Tier I engines have been certified to the earlier, 1997, version of the NO_x Technical Code which, in accordance with *MEPC.1/Circ.679, may continue to be used in certain cases until 1 January 2011. Certification issued in accordance with the 1997 NOx* Technical Code would still remain valid over the service life of such engines.

An engine may be certified on an individual, Engine Family or Engine Group basis in accordance with one or more of the four duty test cycles as given in appendix II of the Annex. In the case of Engine *Family or Engine Group engines it is the Parent Engine which is actually emissions tested, this is the engine which has the combination* of rating (power and speed) and NO_x critical components, settings and operating values which results in the highest NO_x emission value or, where more than one test cycle is to be certified, values which, to be acceptable, each of which must be no higher than the applicable Tier limit value. Subsequent series engines, Member Engines, are thereafter constructed with a rating, components, settings and operating values *within the bounds established for the respective Engine Family or Engine Group. Generally all new engine certification leading to the* issue of an EIAPP Certificate is undertaken at the engine builder's works where the necessary pre-certification survey takes place.

Consequently a diesel engine having an EIAPP Certificate is approved, by, or on behalf of (since almost all engine certification work is delegated to Recognized Organizations), the flag State of the ship onto which it is to be installed, to a stated Tier for one or more duty test cycles, for a particular rating or rating range, and with *defined NO_x critical components, settings and operating values* including options if applicable. Any amendments to these aspects are to be duly approved and documented.

For each NOx certified diesel engine there must be onboard an approved Technical File, NO_x Technical Code 2008, regulation 2.3.4, which both defines the engine as approved and provides the applicable survey regime together with any relevant approved amendment documentation. As of October 2010 virtually all engines *are surveyed using the Parameter Check method, NO_x Technical Code 2008, regulation 2.4.3.1, whereby the actual duty, rating* and NO_x critical components, settings and operating values are checked against the given data in the Technical File. A key document in the Parameter Check procedure is the Record Book of Engine Parameters, NO_x Technical Code 2008, regulation 6.2.2.8, which is maintained to record all replacements and changes to NO_x critical components, settings and operating values. Engine surveys are undertaken on completion of manufacture and subsequently as part of the overall ship survey process; flowcharts illustrating the aspects checked at the various survey stages are given in NO_x Technical Code 2008 appendix II.

In addition, there is the case where a diesel engine is subject to "major conversion", regulation 13.2. Of the three routes given, "substantial modification" and uprating, both as defined, involve changes to an existing installed engine and under these circumstances the relevant Tier is that applicable to the construction date of the ship onto which the engine is installed except, in the case of ships constructed before 1 January 2000, where Tier I is applied. In the third route, that of the installation of a replacement, non-identical, or additional engine then the Tier appropriate to the date of installation applies although,

subject to acceptance by the Administration taking into account guidelines, in some circumstances it would permitted to install a Tier II replacement engine as opposed to one certified to Tier III, regulation 13.2.2. In the case of an identical replacement engine the Tier appropriate to the ship construction date applies.

The revised Annex VI has also introduced the prospect of retrospective NO_x certification, regulation 13.7, in the case of diesel engines of more than 5000 kW power output and a per cylinder displacement of 90 litres and above installed on ships constructed between 1 January 1990 and 31 December 1999. This will generally therefore affect only the main engines on such ships, the 90 litre/cylinder criteria represents, for example in current medium speed engine designs, engines with a bore of 460 mm and above. For these engines if a Party, not necessarily the ship's flag State, has certified an "Approved Method" which results in an emission value no higher than the relevant Tier I level and has advised of that certification to IMO then that Approved Method must be applied no later than the first renewal survey which occurs more than 12 months after deposition of the advice to IMO. However, if the ship owner can demonstrate that the Approved Method is not commercially available at that time then it is to be installed no later than the next annual survey after which it has become available. Given within regulation 13.7 are constraints on the Approved Method that limit its cost and detrimental effects on engine power and fuel consumption. Notifications of Approved Method from Parties are available through GISIS.

Further requirements are given in chapter 7 of the NO_x Technical Code 2008 which includes an outline of the Approved Method File which must be retained with the engine. To date several notifications of Approved Methods have been advised to the Organization. It is not clear the extent to which others will become available however it is expected that, if so developed, these will be limited to involving aspects such as changing the engine's fuel injection nozzles. Consequently, in the case of engines potentially subject to the requirement to install an Approved Method it will be necessary for ship owners (and also surveyors and port State inspectors) to remain vigilant over the service life of those engines as to the availability of such arrangements and to ensure that they are duly fitted and thereafter retained as required. For those engines where an Approved Method exists there is the alternative option, regulation 13.7.1.2, whereby the engine is instead certified in accordance with the conventional NO_x Technical Code requirements.

SECTION G
OIL AND HAZARDOUS SUBSTANCE SPILLS INFORMATION

(a) Oil Spill Response Planning

(a)(2)(i) Regional OSRP Information

All of the proposed activities and facilities in this S-EP will be covered by the Oil Spill Response Plan (OSRP) filed by Fieldwood (BOEM Operator No. 03035) in accordance with 30 CFR 254. The Fieldwood OSRP was found in compliance on January 25, 2018 and the latest revision was approved on July 19, 2019.

(a)(2)(ii) Spill Response Sites

Primary Response Equipment Location	Preplanned Staging Location(s)
Houma, LA Kiln, MS Leeville, LA Venice, LA	Houma, LA Kiln, MS Leeville, LA Port Fourchon, LA

(a)(2)(iii) OSRO Information

Fieldwood's primary equipment providers are Clean Gulf Associates (CGA) and Marine Spill Response Corporation (MSRC). Clean Gulf Associates Services, LLC (CGAS) will provide closest available personnel, as well as a CGAS supervisor to operate the equipment. MSRC personnel are responsible for operating MSRC response equipment.

(a)(2)(iv) Worst-Case Scenario Determination

Category	Regional OSRP WCD	EP WCD
Type of Activity	Drilling >10 Miles Seaward of the Coastline	Drilling >10 Miles Seaward of the Coastline
Facility Location (Area/Block)	*Green Canyon 200*	*Green Canyon 200*
Facility Designation	*Well TA009 (ST01)*	*Well No. TA018*
Distance to Nearest Shoreline (miles)	*88 miles*	*88 miles*
Volume **Storage tanks (total)** **Uncontrolled blowout** **Pipelines** **Total Volume**	 0 466,610 0 **466,610**	 203,751 **203,751**
Type of Oil(s) *(crude, condensate, diesel)*	*Crude*	*Crude*
API Gravity	*32°*	*38.9°*

Fieldwood has determined that the worst-case scenario from the activities proposed in this S-EP do ***not*** supersede the worst-case scenario from our approved Regional OSRP, therefore Fieldwood will not replace the worst-case scenario in our Regional OSRP.

Fieldwood hereby certifies it has the capability to respond, to the maximum extent practicable, to a worst case discharge, or a substantial threat of such a discharge, resulting from the activities proposed in this S-EP.

Please see attached Spill Response Discussion prepared for this S-EP.

(b) Modeling Report

A modeling report is not required for the location of the activities proposed in this plan.

Attachments

1) Spill Response Discussion (*Attachment G-1*)

SPILL RESPONSE DISCUSSION

For the purpose of NEPA and Coastal Zone Management Act analysis, the largest spill volume originating from the proposed activity would be a well blowout during drilling operations, estimated to be 203,751 barrels of crude oil with an API gravity of 38.9°.

Land Segment and Resource Identification

Trajectories of a spill and the probability of it impacting a land segment have been projected utilizing information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website. The results are shown in **Figure 1.** The BOEM OSRAM identifies a 5% probability of impact to the shorelines of Cameron Parish, Louisiana within 30 days. Cameron Parish includes the east side of Sabine Lake, Sabine National Wildlife Refuge, Calcasieu Lake, Lacassine National Wildlife Refuge (inland) and Grand Lake. Cameron Parish also includes the area along the coastline from Sabine Pass to Big Constance Lake in Rockefeller Wildlife Refuge. This region is composed of open public beaches, marshlands and swamps. It serves as a habitat for numerous birds, finfish and other animals, including several rare, threatened and endangered species.

Response

Fieldwood Energy LLC will make every effort to respond to the Worst Case Discharge as effectively as practicable. A description of the response equipment under contract to contain and recover the Worst Case Discharge is shown in **Figure 2.**

Using the estimated chemical and physical characteristics of crude oil, an ADIOS weathering model was run on a similar product from the ADIOS oil database. The results indicate 20% or approximately 40,750 barrels of crude oil would be evaporated/dispersed within 24 hours, with approximately 163,001 barrels remaining.

Natural Weathering Data: GC 200, TA018	**Barrels of Oil**
WCD Volume	203,751
Less 20% natural evaporation/dispersion	40,750
Remaining volume	163,001

Figure 2 outlines equipment, personnel, materials and support vessels as well as temporary storage equipment available to respond to the worst case discharge. The volume accounts for the amount remaining after evaporation/dispersion at 24 hours. The list estimates individual times needed for procurement, load out, travel time to the site and deployment. **Figure 2** also indicates how operations will be supported.

Fieldwood Energy LLC's Oil Spill Response Plan includes alternative response technologies such as dispersants and in-situ burn. Strategies will be decided by Unified Command based on an operations safety analysis, the size of the spill, weather and potential impacts. If aerial

dispersants are utilized, 8 sorties (9,600 gallons) from two of the DC-3 aircrafts and 4 sorties (8,000 gallons) from the Basler aircraft would provide a daily dispersant capability of 7,540 barrels. If the conditions are favorable for in-situ burning, the proper approvals have been obtained and the proper planning is in place, in-situ burning of oil may be attempted. Slick containment boom would be immediately called out and on-scene as soon as possible. Offshore response strategies may include attempting to skim utilizing CGA spill response equipment, with a total derated skimming capacity of 706,980 barrels. Temporary storage associated with skimming equipment equals 32,796 barrels. If additional storage is needed, various storage barges with a total capacity 685,000+ bbls may be mobilized and centrally located to provide temporary storage and minimize off-loading time. **Safety is first priority. Air monitoring will be accomplished and operations deemed safe prior to any containment/skimming attempts.**

If the spill went unabated, shoreline impact in Cameron Parish, Louisiana would depend upon existing environmental conditions. Shoreline protection would include the use of CGA's near shore and shallow water skimmers with a totaled derated skimming capacity of 235,300 barrels. Temporary storage associated with skimming equipment equals 2,841 barrels. If additional storage is needed, various storage barges with a total capacity 276,000+ bbls may be mobilized and centrally located to provide temporary storage and minimize off-loading time. Onshore response may include the deployment of shoreline boom on beach areas, or protection and sorbent boom on vegetated areas. A Letter of Intent from OMI Environmental will ensure access to 31,400 feet of 18" shoreline protection boom. **Figure 2** outlines individual times needed for procurement, load out, travel time to the site and deployment. Strategies would be based upon surveillance and real time trajectories that depict areas of potential impact given actual sea and weather conditions. Applicable Area Contingency Plans (ACPs), Geographic Response Plans (GRPs), and Unified Command (UC) will be consulted to ensure that environmental and special economic resources are correctly identified and prioritized to ensure optimal protection. Shoreline protection strategies depict the protection response modes applicable for oil spill clean-up operations. As a secondary resource, the State of Louisiana Initial Oil Spill Response Plan will be consulted as appropriate to provide detailed shoreline protection strategies and describe necessary action to keep the oil spill from entering Louisiana's coastal wetlands. The UC should take into consideration all appropriate items detailed in Tactics discussion of this Appendix. The UC and their personnel have the option to modify the deployment and operation of equipment to allow for a more effective response to site-specific circumstances. Fieldwood Energy LLC's contract Spill Management Team has access to the applicable ACP(s) and GRP(s).

Based on the anticipated worst case discharge scenario, Fieldwood Energy LLC can be onsite with contracted oil spill recovery equipment with adequate response capacity to contain and recover surface hydrocarbons, and prevent land impact, to the maximum extent practicable, within an estimated 71 hours (based on the equipment's Effective Daily Recovery Capacity (EDRC)).

Initial Response Considerations
Actual actions taken during an oil spill response will be based on many factors to include but not be limited to:

- Safety
- Weather
- Equipment and materials availability
- Ocean currents and tides
- Location of the spill
- Product spilled
- Amount spilled
- Environmental risk assessments
- Trajectory and product analysis
- Well status, i.e., shut in or continual release

Fieldwood Energy LLC will take action to provide a safe, aggressive response to contain and recover as much of the spilled oil as quickly as it is safe to do so. In an effort to protect the environment, response actions will be designed to provide an "in-depth" protection strategy meant to recover as much oil as possible as far from environmentally sensitive areas as possible. Safety will take precedence over all other considerations during these operations.

Coordination of response assets will be supervised by the designation of a SIMOPS group as necessary for close quarter vessel response activities. Most often, this group will be used during source control events that require a significant number of large vessels operating independently to complete a common objective, in close coordination and support of each other. This group must also monitor the subsurface activities of each vessel (ROV, dispersant application, well control support, etc.). The SIMOPS group leader reports to the Source Control Section Chief.

In addition, these activities will be monitored by the spill management team (SMT) and Unified Command via a structured Common Operating Picture (COP) established to track resource and slick movement in real time.

Upon notification of a spill, the following actions will be taken:

- Information will be confirmed
- An assessment will be made and initial objectives set
- OSROs and appropriate agencies will be notified
- ICS 201, Initial Report Form completed
- Initial Safety plan will be written and published
- Unified Command will be established
    - Overall safety plan developed to reflect the operational situation and coordinated objectives
    - Areas of responsibility established for Source Control and each surface operational site
    - On-site command and control established

Offshore Response Actions

Equipment Deployment

Surveillance

- Surveillance Aircraft: within two hours of QI notification, or at first light
- Provide trained observer to provide on site status reports
- Provide command and control platform at the site if needed
- Continual surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continual monitoring of vessel assets using vessel monitoring systems

Dispersant application assets

- Put ASI on standby
- With the FOSC, conduct analysis to determine appropriateness of dispersant application (refer to Section 18)
- Gain FOSC approval for use of dispersants on the surface
- Deploy aircraft in accordance with a plan developed for the actual situation
- Coordinate movement of dispersants, aircraft, and support equipment and personnel
- Confirm dispersant availability for current and long range operations
- Start ordering dispersant stocks required for expected operations

Containment boom

- Call out early and expedite deployment to be on scene ASAP
- Ensure boom handling and mooring equipment is deployed with boom
- Provide continuing reports to vessels to expedite their arrival at sites that will provide for their most effective containment
- Use Vessels of Opportunity (VOO) to deploy and maintain boom

Oceangoing Boom Barge

- Containment at the source
- Increased/enhanced skimmer encounter rate
- Protection booming

In-situ Burn assets

- Determine appropriateness of in-situ burn operation in coordination with the FOSC and affected SOSC
- Determine availability of fire boom and selected ignition systems
- Start ordering fire boom stocks required for expected operations
- Contact boom manufacturer to provide training & tech support for operations, if required
- Determine assets to perform on water operation
- Build operations into safety plan
- Conduct operations in accordance with an approved plan
- Initial test burn to ensure effectiveness

Dedicated off-shore skimming systems
General

- Deployed to the highest concentration of oil
- Assets deployed at safe distance from aerial dispersant and in-situ burn operations

CGA HOSS Barge

- Use in areas with heaviest oil concentrations
- Consider for use in areas of known debris (seaweed, and other floating materials)

CGA 95' Fast Response Vessels (FRVs)

- Designed to be a first vessel on scene
- Capable of maintaining the initial Command and Control function for on water recovery operations
- 24 hour oil spill detection capability
- Highly mobile and efficient skimming capability
- Use as far off-shore as safely possible

CGA FRUs

- To the area of the thickest oil
- Use as far off-shore as allowed
- VOOs 140' – 180' in length
- VOOs with minimum of 18' x 38' or 23' x 50' of optimum deck space
- VOOs in shallow water should have a draft of <10 feet when fully loaded

T&T Koseq Skimming Systems

- To the area of the thickest oil
- Use as far off-shore as allowed
- VOOs with a minimum of 2,000 bbls storage capacity
- VOOs at least 200' in length
- VOOs with deck space of 100' x 40' to provide space for arms, tanks, and crane
- VOOs for shallow water should be deck barges with a draft of <10 feet when fully loaded

Storage Vessels

- Establish availability of CGA contracted assets (See Appendix E)
- Early call out (to allow for tug boat acquisition and deployment speeds)
- Phase mobilization to allow storage vessels to arrive at the same time as skimming systems
- Position as closely as possible to skimming assets to minimize offloading time

Vessels of Opportunity (VOO)

- Use Fieldwood Energy LLC's contracted resources as applicable
- Industry vessels are ideal for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquire additional resources as needed
- Consider use of local assets, i.e. fishing and pleasure craft for ISB operations or boom tending
- Expect mission specific and safety training to be required
- Plan with the US Coast Guard for vessel inspections
- Place VOOs in Division or Groups as needed
- Use organic on-board storage if appropriate
- Maximize non-organic storage appropriate to vessel limitations
- Decant as appropriate after approval to do so has been granted
- Assign bulk storage barges to each Division/Group
- Position bulk storage barges as close to skimming units as possible
- Utilize large skimming vessel (e.g. barges) storage for smaller vessel offloading
- Maximize skimming area (swath) to the optimum width given sea conditions and available equipment
- Maximize use of oleophilic skimmers in all operations, but especially offshore
- Nearshore, use shallow water barges and shuttle to skimming units to minimize offloading time
- Plan and equip to use all offloading capabilities of the storage vessel to minimize offloading time

Adverse Weather Operations:

In adverse weather, when seas are $\geq$ 3 feet, the use of larger recovery and storage vessels, oleophilic skimmers, and large offshore boom will be maximized. KOSEQ Arm systems are built for rough conditions, and they should be used until their operational limit (9.8' seas) is met. Safety will be the overriding factor in all operations and will cease at the order of the Unified Command, vessel captain, or in an emergency, "stop work" may be directed by any crew member.

Surface Oil Recovery Considerations and Tactics
(Offshore and Near-shore Operations)

Maximization of skimmer-oil encounter rate

- Place barges in skimming task forces, groups, etc., to reduce recovered oil offloading time
- Place barges alongside skimming systems for immediate offloading of recovered oil when practicable
- Use two vessels, each with heavy sea boom, in an open-ended "V" configuration to funnel surface oil into a trailing skimming unit's organic, V-shaped boom and skimmer (see page 7, *CGA Equipment Guide Book and Tactic Manual* (CGATM)

- Use secondary vessels and heavy sea boom to widen boom swath beyond normal skimming system limits (see page 15, CGATM)
- Consider night-time operations, first considering safety issues
- Utilize all available advanced technology systems (IR, X-Band Radar, etc.) to determine the location of, and move to, recoverable oil
- Confirm the presence of recoverable oil prior to moving to a new location

Maximize skimmer system efficiency

- Place weir skimming systems in areas of calm seas and thick oil
- Maximize the use of oleophilic skimming systems in heavier seas
- Place less mobile, high EDRC skimming systems (e.g. HOSS Barge) in the largest pockets of the heaviest oil
- Maximize onboard recovered oil storage for vessels.
- Obtain authorization for decanting of recovered water as soon as possible
- Use smaller, more agile skimming systems to recover streamers of oil normally found farther from the source. Place recovered oil barges nearby

Recovered Oil Storage

- Smaller barges in larger quantities will increase flexibility for multi-location skimming operations
- Place barges in skimming task forces, groups, etc., to reduce recovered oil offloading time
- Procure and deploy the maximum number of portable tanks to support Vessel of Opportunity Skimming Systems if onboard storage is not available
- Maximize use of the organic recovered oil storage capacity of the skimming vessel

Command, Control, and Communications (C^3)

- Publish, implement, and fully test an appropriate communications plan
- Design an operational scheme, maintaining a manageable span of control
- Designate and mark C^3 vessels for easy aerial identification
- Designate and employ C^3 aircraft for task forces, groups, etc.
- Use reconnaissance air craft and Rapid Response Teams (RAT) to confirm the presence of recoverable oil

On Water Recovery Group
When the first skimming vessel arrives on scene, a complete site assessment will be conducted before recovery operations begin. Once it is confirmed that the air monitoring readings for O2, LEL, H2S, CO, VOC, and Benzene are all within the permissible limits, oil recovery operations may begin.

As skimming vessels arrive, they will be organized to work in areas that allow for the most efficient vessel operation and free vessel movement in the recovery of oil. Vessel groups will vary in structure as determined by the Operations Section of the Unified Command, but will generally consist, at a minimum, of the following dedicated assets:

- 3 to 5 – Offshore skimming vessels (recovery)
- 1 – Tank barge (temporary storage)
- 1 – Air asset (tactical direction)
- 2 – Support vessels (crew/utility for supply)
- 6 to 10 – Boom vessels (enhanced booming)

Example *(**Note:** Actual organization of TFs will be dependent on several factors including, asset availability, weather, spilled oil migration, currents, etc.)*

The 95' FRV Breton Island out of Venice arrives on scene and conducts an initial site assessment. Air monitoring levels are acceptable and no other visual threats have been observed. The area is cleared for safe skimming operations. The Breton Island assumes command and control (CoC) of on-water recovery operations until a dedicated non-skimming vessel arrives to relieve it of those duties.

A second 95' FRV arrives and begins recovery operations alongside the Breton Island. Several more vessels begin to arrive, including a third 95' FRV out of Galveston, the HOSS Barge (High Volume Open Sea Skimming System) out of Harvey, a boom barge (CGA 300) with 25,000' of 42" auto boom out of Leeville, and 9 Fast Response Units (FRUs) from the load-out location at C-Port in Port Fourchon.

As these vessels set up and begin skimming, they are grouped into task forces (TFs) as directed by the Operations Section of the Unified Command located at the command post.

Initial set-up and potential actions:

- A 1,000 meter safety zone has been established around the incident location for vessels involved in Source Control
- The HOSS Barge is positioned facing the incident location just outside of this safety zone or at the point where the freshest oil is reaching the surface
- The HOSS Barge engages its Oil Spill Detection (OSD) system to locate the heaviest oil and maintains that ability for 24-hour operations

- The HOSS Barge deploys 1,320' of 67" Sea Sentry boom on each side, creating a swath width of 800'
- The Breton Island and H.I. Rich skim nearby, utilizing the same OSD systems as the HOSS Barge to locate and recover oil
- Two FRUs join this group and it becomes TF1
- The remaining 7 FRUs are split into a 2 and 3 vessel task force numbered TF2 and TF3
- A 95' FRV is placed in each TF
- The boom barge (CGA 300) is positioned nearby and begins deploying auto boom in sections between two utility vessels (1,000' to 3,000' of boom, depending on conditions) with chain-link gates in the middle to funnel oil to the skimmers
- The initial boom support vessels position in front of TF2 and TF3
- A 100,000+ barrel offshore tank barge is placed with each task force as necessary to facilitate the immediate offload of skimming vessels

The initial task forces (36 hours in) may be structured as follows:

TF 1

- 1 – 95' FRV
- 1 – HOSS Barge with 3 tugs
- 2 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

TF 2

- 1 – 95' FRV
- 4 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 10 – 500' sections of auto boom with gates
- 10 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

TF 3

- 1 – 95' FRV
- 3 – FRUs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels
- 2 – Support vessels (crew/utility)

Offshore skimming equipment continues to arrive in accordance with the ETA data listed in figure H.3a; this equipment includes 2 AquaGuard skimmers and 11 sets of Koseq Rigid Skimming Arms. These high volume heavy weather capable systems will be divided into functional groups and assigned to specific areas by the Operations Section of the Unified Command.

At this point of the response, the additional TFs may assume the following configurations:

TF 4

- 2 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – AquaGuard Skimmer
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

TF 5

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – AquaGuard Skimmer
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 8 – 500' sections of auto boom with gates
- 8 – Boom-towing vessels

TF 6

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

TF 7

- 3 – Sets of Koseq Rigid Skimming Arms w/ associated 200'+ PIDVs
- 1 – 100,000+ barrel tank barge and associated tug(s)
- 1 – Dedicated air asset for tactical direction
- 2 – Support vessels (crew/utility)
- 6 – 500' sections of auto boom with gates
- 6 – Boom-towing vessels

CGA Minimum Acceptable Capabilities for Vessels of Opportunity (VOO)
Minimum acceptable capabilities of Petroleum Industry Designed Vessels (PIDV) for conducting Vessel of Opportunity (VOO) skimming operations are shown in the table below. PIDVs are "purpose-built" to provide normal support to offshore oil and gas operators. They include but are not limited to utility boats, offshore supply vessels, etc. They become VOOs when tasked with oil spill response duties.

Capability	FRU	KOSEQ	AquaGuard
Type of Vessel	Utility Boat	Offshore Supply Vessel	Utility Boat
Operating parameters			
Sea State	3-5 ft max	9.8 ft max	3-5 ft max
Skimming speed	≤1 kt	≤3 kts	≤1 kt
Vessel size			
Minimum Length	100 ft	200 ft	100 ft
Deck space for: • Tank(s) • Crane(s) • Boom Reels • Hydraulic Power Units • Equipment Boxes	18x32 ft	100x40 ft	18x32 ft
Communication Assets	Marine Band Radio	Marine Band Radio	Marine Band Radio

Tactical use of Vessels of Opportunity (VOO): Fieldwood Energy LLC will take all possible measures to maximize the oil-to-skimmer encounter rate of all skimming systems, to include VOOs, as discussed in this section. VOOs will normally be placed within an On-water recovery unit as shown in figures below.

Skimming Operations: PIDVs are the preferred VOO skimming platform. OSROs are more versed in operating on these platforms and the vessels are generally large enough with crews more likely versed in spill response operations. They also have a greater possibility of having on-board storage capacity and the most likely vessels to be under contract, and therefore more readily available to the operator. These vessels would normally be assigned to an on-water recovery group/division (see figure below) and outfitted with a VOSS suited for their size and capabilities. Specific tactics used for skimming operations would be dependent upon many parameters which include, but are not limited to, safety concerns, weather, type VOSS on board, product being recovered, and area of oil coverage. Planners would deploy these assets with the objective of safely maximizing oil- to-skimmer encounter rate by taking actions to minimize non-skimming time and maximizing boom swath. Specific tactical configurations are shown in figures below.

The Fast Response Unit (FRU): A self-contained, skid based, skimming system that is deployed from the right side of a vessel of opportunity (VOO). An outrigger holds a 75' long section of air inflatable boom in place that directs oil to an apex for recovery via a Foilex 250 weir skimmer. The outrigger creates roughly a 40' swath width dependent on the VOO beam. The lip of the collection bowl on the skimmer is placed as close to the oil and water interface as possible to maximize oil recovery and minimize water retention. The skimmer then pumps all fluids recovered to the storage tank where it is allowed to settle, and with the approval of the Coast Guard, the water is decanted from the bottom of the tank back into the water ahead of the containment boom to be recycled through the system. Once the tank is full of as much pure recovered oil as possible it is offloaded to a storage barge for disposal in accordance with an approved disposal plan. A second 100 barrel storage tank can be added if the appropriate amount of deck space is available to use as secondary storage.

Tactical Overview

Mechanical Recovery – The FRU is designed to provide fast response skimming capability in the offshore and nearshore environment in a stationary or advancing mode. It provides a rated daily recovery capacity of 4,100 barrels. An additional boom reel with 440' of offshore boom can be deployed along with the FRU, and a second support vessel for boom towing, to extend the swath width when attached to the end of the fixed boom. The range and sustainability offshore is dependent on the VOO that the unit is placed on, but generally these can stay offshore for extended periods. The FRU works well independently or assigned with other on-water recovery assets in a task force. In either case, it is most effective when a designated aircraft is assigned to provide tactical direction to ensure the best placement in recoverable oil.
Maximum Sea Conditions – Under most circumstances the FRU can maintain standard oil spill recovery operations in 2' to 4' seas. Ultimately, the Coast Guard licensed Captain in charge of the VOO (with input from the CGAS Supervisor assigned) will be responsible to determine when the sea conditions have surpassed the vessel's safe operating capabilities.

Possible Task Force Configuration (Multiple VOOs can be deployed in a task force)
1 – VOO (100' to 165' Utility or Supply Vessel)
1 – Boom reel w/support vessel for towing
1 – Tank barge (offshore) for temporary storage
1 – Utility/Crewboat (supply)
1 – Designated spotter aircraft

The VOSS (yellow) is being deployed and connected to an out-rigged arm. This is suitable for collection in both large pockets of oil and for recovery of streaming oil. The oil-to-skimmer encounter rate is limited by the length of the arm. Skimming pace is ≤ 1 knot.

Through the use of an additional VOO, and using extended sea boom, the swath of the VOSS is increased therefore maximizing the oil-to-skimmer encounter rate. Skimming pace is ≤ 1 knot.

The Koseq Rigid Sweeping Arm: A skimming system deployed on a vessel of opportunity. It requires a large Offshore or Platform Supply Vessel (OSV/PSV), greater than 200' with at least 100' x 50' of free deck space. On each side of the vessel, a 50' long rigid framed Arm is deployed that consists of pontoon chambers to provide buoyancy, a smooth nylon face, and a hydraulically adjustable mounted weir skimmer. The Arm floats independently of the vessel and is attached by a tow bridle and a lead line. The movement of the vessel forward draws the rubber end seal of the arm against the hull to create a collection point for free oil directed to the weir by the Arm face. The collection weir is adjusted to keep the lip as close to the oil water interface as possible to maximize oil recovery while attempting to minimize excess water collection. A transfer pump (combination of positive displacement, screw type and centrifuge suited for highly viscous oils) pump the recovered liquid to portable tanks and/or dedicated fixed storage tanks onboard the vessel. After being allowed to sit and separate, with approval from the Coast Guard, the water can be decanted (pumped off) in front of the collection arm to be reprocessed through the system. Once full with as much pure recovered oil as possible, the oil is transferred to a temporary storage barge where it can be disposed of in accordance with an approved disposal plan.

Tactical Overview

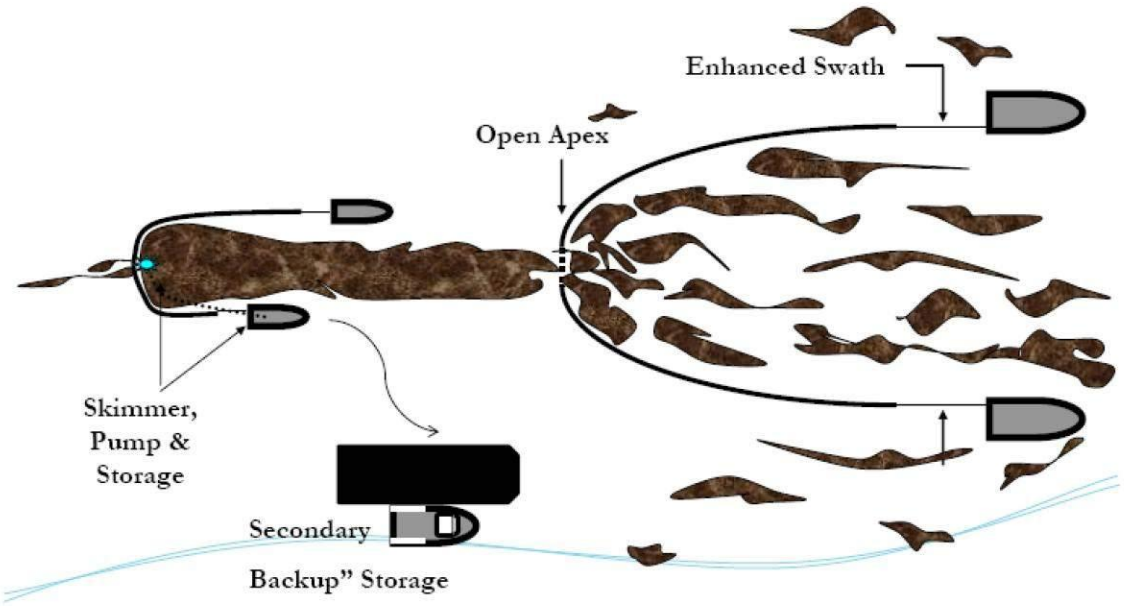
Mechanical Recovery – Deployed on large vessels of opportunity (VOO) the Koseq Rigid Sweeping Arms are high volume surge capacity deployed to increase recovery capacity at the source of a large oil spill in the offshore and outer nearshore environment of the Gulf of Mexico. They are highly mobile and sustainable in rougher sea conditions than normal skimming vessels (9.8' seas). The large Offshore Supply Vessels (OSV) required to deploy the Arms are able to remain on scene for extended periods, even when sea conditions pick up. Temporary storage on deck in portable tanks usually provides between 1,000 and 3,000 bbls. In most cases, the OSV will be able to pump 20% of its deadweight into the liquid mud tanks in accordance with the vessels Certificate of Inspection (COI). All storage can be offloaded utilizing the vessels liquid transfer system.

Maximum Sea Conditions - Under most circumstances the larger OSVs are capable of remaining on scene well past the Skimming Arms maximum sea state of 9.8'. Ultimately it will be the decision of the VOO Captain, with input from the T&T Supervisor onboard, to determine when the sea conditions have exceeded the safe operating conditions of the vessel.

Command and Control – The large OSVs in many cases have state of the art communication and electronic systems, as well as the accommodations to support the function of directing all skimming operations offshore and reporting back to the command post.

Possible Task Force Configuration (Multiple Koseq VOOs can be deployed in a task force)

1 – $\geq$ 200' Offshore Supply Vessels (OSV) with set of Koseq Arms
2 to 4 portable storage tanks (500 bbl)
1 – Modular Crane Pedestal System set (MCPS) or 30 cherry picker (crane) for deployment
1 – Tank barge (offshore) for temporary storage
1 – Utility/Crewboat (supply)
1 – Designated spotter aircraft
4 – Personnel (4 T&T OSRO)



Scattered oil is "caught" by two VOO and collected at the apex of the towed sea boom. The oil moves thought a "gate" at that apex, forming a larger stream of oil which moves into the boom of the skimming vessel. Operations are paced at >1. A recovered oil barge stationed nearby to minimize time taken to offload recovered oil.

This is a depiction of the same operation as above but using KOSEQ Arms. In this configuration, the collecting boom speed dictates the operational pace at $\geq$ 1 knot to minimize entrainment of the oil.

Clean Gulf Associates (CGA) Procedure for Accessing Member-Contracted and other Vessels of Opportunity (VOOs) for Spill Response

- CGA has procedures in place for CGA member companies to acquire vessels of opportunity (VOOs) from an existing CGA member's contracted fleet or other sources for the deployment of CGA portable skimming equipment including Koseq Arms, Fast Response Units (FRUs) and any other portable skimming system(s) deemed appropriate for the response for a potential or actual oil spill, WCD oil spill or a Spill of National Significance (SONS).

- CGA uses Port Vision, a web-based vessel and terminal interface that empowers CGA to track vessels through Automatic Identification System (AIS) and terminal activities using a Geographic Information System (GIS). It provides live AIS/GIS views of waterways showing current vessel positions, terminals, created vessel fleets, and points-of-interest. Through this system, CGA has the ability to get instant snapshots of the location and status of all vessels contracted to CGA members, day or night, from any web-enabled PC.

Near Shore Response Actions

Timing

- Put near shore assets on standby and deployment in accordance with planning based on the actual situation, actual trajectories and oil budgets
- VOO identification and training in advance of spill nearing shoreline if possible
- Outfitting of VOOs for specific missions
- Deployment of assets based on actual movement of oil

Considerations

- Water depth, vessel draft
- Shoreline gradient
- State of the oil
- Use of VOOs
- Distance of surf zone from shoreline

Surveillance

- Provide trained observer to direct skimming operations
- Continual surveillance of oil movement by remote sensing systems, aerial photography and visual confirmation
- Continual monitoring of vessel assets

Dispersant Use

- Generally will not be approved within 3 miles of shore or with less than 10 meters of water depth
- Approval would be at Regional Response Team level (Region 6)

Dedicated Near Shore skimming systems

- FRVs
- Egmopol and Marco SWS
- Operate with aerial spotter directing systems to observed oil slicks

VOO

- Use Fieldwood Energy LLC's contracted resources as applicable
- Industry vessel are usually best for deployment of Vessel of Opportunity Skimming Systems (VOSS)
- Acquire additional resources as needed
- Consider use of local assets, i.e. fishing and pleasure craft
- Expect mission specific and safety training to be required
- Plan with the US Coast Guard for vessel inspections
- Operate with aerial spotter directing systems to oil patches

Shoreline Protection Operations

Response Planning Considerations

- Review appropriate Area Contingency Plan(s)
- Locate and review appropriate Geographic Response and Site Specific Plans
- Refer to appropriate Environmentally Sensitive Area Maps
- Capability for continual analysis of trajectories run periodically during the response
- Environmental risk assessments (ERA) to determine priorities for area protection
- Time to acquire personnel and equipment and their availability
- Refer to the State of Louisiana Initial Oil Spill Response Plan, Deep Water Horizon, dated 2 May 2010, as a secondary reference
- Aerial surveillance of oil movement
- Pre-impact beach cleaning and debris removal
- Shoreline Cleanup Assessment Team (SCAT) operations and reporting procedures
- Boom type, size and length requirements and availability
- Possibility of need for In-situ burning in near shore areas
- Current wildlife situation, especially status of migratory birds and endangered species in the area
- Check for Archeological sites and arrange assistance for the appropriate state agency when planning operations the may impact these areas

Placement of boom

- Position boom in accordance with the information gained from references listed above and based on the actual situation
- Determine areas of natural collection and develop booming strategies to move oil into those areas
- Assess timing of boom placement based on the most current trajectory analysis and the availability of each type of boom needed. Determine an overall booming priority and conduct booming operations accordingly. Consider:
    - Trajectories
    - Weather forecast
    - Oil Impact forecast
    - Verified spill movement
    - Boom, manpower and vessel (shallow draft) availability
    - Near shore boom and support material, (stakes, anchors, line)

Beach Preparation - Considerations and Actions

- Use of a 10 mile go/no go line to determine timing of beach cleaning
- SCAT reports and recommendations
- Determination of archeological sites and gaining authority to enter
- Monitoring of tide tables and weather to determine extent of high tides
- Pre cleaning of beaches by moving waste above high tide lines to minimize waste
- Determination of logistical requirements and arranging of waste removal and disposal

- Staging of equipment and housing of response personnel as close to the job site as possible to maximize on-site work time
- Boom tending, repair, replacement and security (use of local assets may be advantageous)
- Constant awareness of weather and oil movement for resource re-deployment as necessary
- Earthen berms and shoreline protection boom may be considered to protect sensitive inland areas
- Requisitioning of earth moving equipment
- Plan for efficient and safe use of personnel, ensuring:
    - A continual supply of the proper Personal Protective Equipment
    - Heating or cooling areas when needed
    - Medical coverage
    - Command and control systems (i.e. communications)
    - Personnel accountability measures
- Remediation requirements, i.e., replacement of sands, rip rap, etc.
- Availability of surface washing agents and associated protocol requirements for their use (see National Contingency Plan Product Schedule for list of possible agents)
- Discussions with all stakeholders, i.e., land owners, refuge/park managers, and others as appropriate, covering the following:
    - Access to areas
    - Possible response measures and impact of property and ongoing operations
    - Determination of any specific safety concerns
    - Any special requirements or prohibitions
    - Area security requirements
    - Handling of waste
    - Remediation expectations
    - Vehicle traffic control
    - Domestic animal safety concerns
    - Wildlife or exotic game concerns/issues

Inland and Coastal Marsh Protection and Response Considerations and Actions

- All considered response methods will be weighed against the possible damage they may do to the marsh. Methods will be approved by the Unified Command only after discussions with local Stakeholder, as identified above.
    - In-situ burn may be considered when marshes have been impacted
- Passive clean up of marshes should considered and appropriate stocks of sorbent boom and/or sweep obtained.
- Response personnel must be briefed on methods to traverse the marsh, i.e.,
    - use of appropriate vessel
    - use of temporary walkways or road ways
- Discuss and gain approval prior cutting or moving vessels through vegetation
- Discuss use of vessels that may disturb wildlife, i.e, airboats
- Safe movement of vessels through narrow cuts and blind curves

- Consider the possibility that no response in a marsh may be best
- In the deployment of any response asset, actions will be taken to ensure the safest, most efficient operations possible. This includes, but is not limited to:
    - Placement of recovered oil or waste storage as near to vessels or beach cleanup crews as possible.
    - Planning for stockage of high use items for expeditious replacement
    - Housing of personnel as close to the work site as possible to minimize travel time
    - Use of shallow water craft
    - Use of communication systems appropriate ensure command and control of assets
    - Use of appropriate boom in areas that I can offer effective protection
    - Planning of waste collection and removal to maximize cleanup efficiency
- Consideration or on-site remediation of contaminated soils to minimize replacement operations and impact on the area

Decanting Strategy

Recovered oil and water mixtures will typically separate into distinct phases when left in a quiescent state. When separation occurs, the relatively clean water phase can be siphoned or decanted back to the recovery point with minimal, if any, impact. Decanting therefore increases the effective on-site oil storage capacity and equipment operating time. FOSC/SOSC approval will be requested prior to decanting operations. This practice is routinely used for oil spill recovery.

CGA Equipment Limitations

The capability for any spill response equipment, whether a dedicated or portable system, to operate in differing weather conditions will be directly in relation to the capabilities of the vessel the system in placed on. Most importantly, however, the decision to operate will be based on the judgment of the Unified Command and/or the Captain of the vessel, who will ultimately have the final say in terminating operations. Skimming equipment listed below may have operational limits which exceed those safety thresholds. As was seen in the Deepwater Horizon (DWH) oil spill response, vessel skimming operations ceased when seas reached 5-6 feet and vessels were often recalled to port when those conditions were exceeded. Systems below are some of the most up-to-date systems available and were employed during the DWH spill.

Boom	3 foot seas, 20 knot winds
Dispersants	Winds more than 25 knots Visibility less than 3 nautical miles Ceiling less than 1,000 feet.
FRU	8 foot seas
HOSS Barge/OSRB	8 foot seas
Koseq Arms	8 foot seas
OSRV	4 foot seas

Environmental Conditions in the GOM

Louisiana is situated between the easterly and westerly wind belts, and therefore, experiences westerly winds during the winter and easterly winds in the summer. Average wind speed is generally 14-15 mph along the coast. Wave heights average 4 and 5 feet. However, during hurricane season, Louisiana has recorded wave heights ranging from 40 to 50 feet high and winds reaching speeds of 100 mph. Because much of southern Louisiana lies below sea level, flooding is prominent.

Surface water temperature ranges between 70 and 80 ° F during the summer months. During the winter, the average temperature will range from 50 and 60 ° F.

The Atlantic and Gulf of Mexico hurricane season is officially from 1 June to 30 November. 97% of all tropical activity occurs within this window. The Atlantic basin shows a very peaked season from August through October, with 78% of the tropical storm days, 87% of the minor (Saffir-Simpson Scale categories 1 and 2) hurricane days, and 96% of the major (Saffir-Simpson categories 3, 4 and 5) hurricane days occurring then. Maximum activity is in early to mid September. Once in a few years there may be a hurricane occurring "out of season" - primarily in May or December. Globally, September is the most active month and May is the least active month.

FIGURE 1
TRAJECTORY BY LAND SEGMENT

Trajectory of a spill and the probability of it impacting a land segment have been projected utilizing Fieldwood Energy LLC's WCD and information in the BOEM Oil Spill Risk Analysis Model (OSRAM) for the Central and Western Gulf of Mexico available on the BOEM website using 30 day impact. The results are tabulated below.

Area/Block	OCS-G	Launch Area	Land Segment and/or Resource	Conditional Probability (%)
				30 day
GC 200, TA018	G12209	C44	Matagorda, TX	1
			Galveston, TX	2
88 miles from shore			Jefferson, TX	1
			Cameron, LA	**5**
			Vermilion, LA	2
			Terrebonne, LA	2
			Lafourche, LA	1
			Jefferson, LA	1
			Plaquemines, LA	4

WCD Scenario– <u>BASED ON WELL BLOWOUT DURING DRILLING OPERATIONS</u> (88 miles from shore)
163,001 bbls of crude oil (Volume considering natural weathering)
API Gravity 38.9°

FIGURE 2 – Equipment Response Time to GC 200, TA018

Dispersants/Surveillance

Dispersant/Surveillance	Dispersant Capacity (gal)	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to site	Total Hrs
ASI							
Basler 67T	2000	2	Houma	2	2	0.7	4.7
DC 3	1200	2	Houma	2	2	0.9	4.9
DC 3	1200	2	Houma	2	2	0.9	4.9
Aero Commander	NA	2	Houma	2	2	0.7	4.7

Offshore Response

Offshore Equipment Pre-Determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
HOSS Barge	76285	4000	3 Tugs	8	Harvey	6	0	12	11.3	2	31.3
95' FRV	22885	249	NA	6	Galveston	2	0	2	13	1	18
95' FRV	22885	249	NA	6	Leeville	2	0	2	5	1	10
95' FRV	22885	249	NA	6	Venice	2	0	3	5.5	1	11.5
95' FRV	22885	249	NA	6	Vermilion	2	0	3	8.5	1	14.5
Boom Barge (CGA-300) 42" Auto Boom (25000')	NA	NA	1 Tug 50 Crew	4 (Barge) 2 (Per Crew)	Leeville	8	0	4	14.5	2	28.5
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2603	NA	25000	1 Tug	6	Amelia	26	0	6	15	1	48
Kirby Offshore (available through contract with CGA)											
RO Barge	NA	80000+	1 Tug	6	Venice	41	0	4	14	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	41	0	4	14	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	41	0	4	14	1	60
RO Barge	NA	80000+	1 Tug	6	Venice	41	0	4	14	1	60
RO Barge	NA	100000+	1 Tug	6	Venice	41	0	4	14	1	60
RO Barge	NA	110000+	1 Tug	6	Venice	41	0	4	14	1	60
RO Barge	NA	130000+	1 Tug	6	Venice	41	0	4	14	1	60

Staging Area: Cameron

Offshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Site	Hrs to Deploy	Total Hrs
T&T Marine (available through direct contract with CGA)											
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Galveston	4	12	12	8.5	2	38.5
Aqua Guard Triton RBS (1)	22323	2000	1 Utility	6	Harvey	4	12	3	8.5	2	29.5
Koseq Skimming Arms (10) Lamor brush	228850	10000	5 OSV	30	Galveston	24	24	12	8.5	2	70.5
Koseq Skimming Arms (6) MariFlex 150 HF	108978	6000	3 OSV	18	Galveston	24	24	12	8.5	2	70.5
Koseq Skimming Arms (2) Lamor brush	45770	2000	1 OSV	6	Harvey	24	24	3	8.5	2	61.5
Koseq Skimming Arms (4) MariFlex 150 HF	72652	4000	2 OSV	12	Harvey	24	24	3	8.5	2	61.5
CGA											
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Morgan City	2	6	3	8.5	1	20.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Vermilion	2	6	5.5	8.5	1	23
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Galveston	2	6	12	8.5	1	29.5
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Aransas Pass	2	6	16.5	8.5	1	34
FRU (1) + 100 bbl Tank (2)	4251	200	1 Utility	6	Lake Charles	2	6	7	8.5	1	24.5
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Leeville	2	6	0.5	8.5	1	18
FRU (2) + 100 bbl Tank (4)	8502	400	2 Utility	12	Venice	2	6	5	8.5	1	22.5
Hydro-Fire Boom	NA	NA	8 Utility	40	Harvey	0	24	3	8.5	6	41.5

Nearshore Response

Nearshore Equipment Pre-determined Staging	EDRC	Storage Capacity	VOO	Persons Required	From	Hrs to Procure	Hrs to Loadout	Hrs to GOM	Travel to Spill Site	Hrs to Deploy	Total Hrs
CGA											
Mid-Ship SWS	22885	249	NA	4	Leeville	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Venice	2	0	N/A	48	1	51
Mid-Ship SWS	22885	249	NA	4	Galveston	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Morgan City	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Lake Charles	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Vermilion	2	0	N/A	48	1	51
Trinity SWS	21500	249	NA	4	Galveston	2	0	N/A	48	1	51
46' FRV	15257	65	NA	4	Aransas Pass	2	0	2	16	1	21
46' FRV	15257	65	NA	4	Morgan City	2	0	2	6	1	11
46' FRV	15257	65	NA	4	Lake Charles	2	0	2	2.5	1	7.5
46' FRV	15257	65	NA	4	Venice	2	0	2	11	1	16
Kirby Offshore (Available through contract with CGA)											
RO Barge	NA	100000+	1 Tug	6	Venice	24	0	4	31	1	60
Enterprise Marine Services LLC (Available through contract with CGA)											
CTCo 2604	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2605	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2606	NA	20000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2607	NA	23000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2608	NA	23000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 2609	NA	23000	1 Tug	6	Amelia	26	0	6	15	1	48
CTCo 5001	NA	47000	1 Tug	6	Amelia	26	0	6	15	1	48

Staging Area: Cameron

Nearshore Equipment With Staging	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Load Out	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
SWS Egmopol	1810	100	NA	3	Galveston	2	2	5	2	1	12
SWS Egmopol	1810	100	NA	3	Morgan City	2	2	4.5	2	1	11.5
SWS Marco	3588	20	NA	3	Lake Charles	2	2	2	2	1	9
SWS Marco	3588	34	NA	3	Leeville	2	2	7	2	1	14
SWS Marco	3588	34	NA	3	Venice	2	2	9.5	2	1	16.5
Foilex Skim Package (TDS 150)	1131	50	NA	3	Lake Charles	4	12	2	2	2	22
Foilex Skim Package (TDS 150)	1131	50	NA	3	Galveston	4	12	5	2	2	25
Foilex Skim Package (TDS 150)	1131	50	NA	3	Harvey	4	12	7	2	2	27
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Lake Charles	2	2	2	2	1	9
4 Drum Skimmer (Magnum 100)	680	100	1 Crew	3	Harvey	2	2	7	2	1	14
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Lake Charles	2	2	2	2	1	9
2 Drum Skimmer (TDS 118)	240	100	1 Crew	3	Harvey	2	2	7	2	1	14

Staging Area: Cameron

Shoreline Protection Boom	VOO	Persons Req.	Storage/Warehouse Location	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment Site	Hrs to Deploy	Total Hrs
OMI Environmental (available through Letter of Intent)									
12,500' 18" Boom	6 Crew	12	New Iberia, LA	1	1	4	2	3	11
6,400' 18" Boom	3 Crew	6	Houston, TX	1	1	4	2	3	11
3,500' 18" Boom	2 Crew	4	Port Arthur, TX	1	1	2	2	3	9
8,000' 18" Boom	3 Crew	6	Port Allen, LA	1	1	5	2	3	12
1,000' 18" Boom	1 Crew	2	Hackberry, LA	1	1	1	2	3	8

Wildlife Response	EDRC	Storage Capacity	VOO	Persons Req.	From	Hrs to Procure	Hrs to Loadout	Travel to Staging	Travel to Deployment	Hrs to Deploy	Total Hrs
CGA											
Wildlife Support Trailer	NA	NA	NA	2	Harvey	2	2	7	1	2	14
Bird Scare Guns (24)	NA	NA	NA	2	Harvey	2	2	7	1	2	14
Bird Scare Guns (12)	NA	NA	NA	2	Galveston	2	2	5	1	2	12
Bird Scare Guns (12)	NA	NA	NA	2	Aransas Pass	2	2	9.5	1	2	16.5
Bird Scare Guns (48)	NA	NA	NA	2	Lake Charles	2	2	2	1	2	9
Bird Scare Guns (24)	NA	NA	NA	2	Leeville	2	2	7	1	2	14

Response Asset	Total
Offshore EDRC	706,980
Offshore Recovered Oil Capacity	717,796+
Nearshore / Shallow Water EDRC	235,300
Nearshore / Shallow Water Recovered Oil Capacity	278,841+

SECTION H
ENVIRONMENTAL MONITORING INFORMATION

(a) Monitoring Systems

There are no environmental monitoring systems currently in place or planned for the proposed activities.

(b) Incidental Takes

No incidental takes are anticipated. Fieldwood implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from both BOEM and BSEE:

- **NTL 2015-G03** "Marine Trash and Debris Awareness and Elimination"
- **NTL 2016-G01** "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"
- **NTL 2016-G02** "Implementation of Seismic Survey Mitigation Measure & Protected Species Observer Program"

(c) Flower Garden Banks National Marine Sanctuary

Green Canyon Block 200 is not located in the Flower Garden Banks National Marine Sanctuary therefore, the requested information is not required in this S-EP.

SECTION I
LEASE STIPULATIONS INFORMATION

Green Canyon Block 200, Lease No. OCS-G12209 is subject to the following lease stipulations:

- **Stipulation No.1: Protection of Archaeological Resources**
  Lease Stipulation No.1 is protection of archaeological resources such as any prehistoric or historic district, site, building, structure or object (including shipwrecks); such term includes artifacts, records, and remains which are related to such a district, site, building, structure or object. If lessee discovers any archaeological resource while conducting operations on the lease area, the lessee shall report the discovery immediately to the Regional Director (RD). The lessee shall make every reasonable effort to preserve the archaeological resource until the RD has told the lessee how to protect it.

- **Stipulation No.4: Military Area (W-92)**
  Green Canyon Block 200 is located within designated Military Warning Area 92 (MWA-92). The Fleet Area Control and Surveillance Facility will be contacted in order to coordinate and control the electromagnetic emissions during the proposed operations.

In addition to the above stipulation, Fieldwood will operate in accordance with the following Notices to Lessees (NTLs) in order to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species, and the prevention of intentional and/or accidental introduction of debris into the marine environment:

- **NTL No. 2015-G03** "Marine Trash and Debris Awareness and Elimination"
- **NTL No. 2016-G01** "Vessel Strike Avoidance and lnjured/Dead Protected Species Reporting"
- **NTL No. 2016-G02** "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"

SECTION J
ENVIRONMENTAL MITIGATION MEASURES INFORMATION

(a) Measures Taken to Minimize or Mitigate Environmental Impacts

The proposed action will implement mitigation measures required by laws and regulations, including all applicable Federal & State requirements concerning air emissions, discharges to water, and solid waste disposal, as well as any additional permit requirements and Fieldwood's policies. Project activities will be conducted in accordance with the Regional OSRP.

(b) Incidental Takes

Fieldwood does not anticipate any incidental takes related to the proposed operations. Fieldwood implements the mitigation measures and monitors for incidental takes of protected species according to the following notices to lessees and operators from both BOEM and BSEE:

- **NTL No. 2015-G03** "Marine Trash and Debris Awareness and Elimination"
- **NTL No. 2016-G01** "Vessel Strike Avoidance and lnjured/Dead Protected Species Reporting"
- **NTL No. 2016-G02** "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"

SECTION K
SUPPORT VESSELS, OFFSHORE VEHICLES, AND AIRCRAFT

(a) General

Fieldwood will utilize the most practical, direct route from the shore base as permitted by weather and traffic conditions.

(b) Air Emissions

Type of Vessel	Maximum Fuel Tank Capacity	Maximum Number in Area at Any Time	Trip Frequency or Duration
Crew Boat	400 bbls	1	4 trips / week
Supply Boat	2,380 bbls	1	3 trips / week
Helicopter	760 gallons	1	As Needed

Diesel Oil Supply			
Size of Fuel Supply Vessel	**Capacity of Fuel Supply Vessel**	**Frequency of Fuel Transfers**	**Route Fuel Supply Vessel Will Take**
299'	6,229 bbls	Bi-Weekly	From Fourchon Shorebase to GC 200
282'	6,228 bbls	Monthly	From Fourchon Shorebase to GC 200

(c) Drilling Fluids and Chemical Products Transportation

Please see enclosed Table 2 titled, "*Waste and Surplus Estimated to be Transported and/or Disposed of Onshore.*"

(d) Solid and Liquid Wastes Transportation

Please see enclosed Table 2 titled, "*Waste and Surplus Estimated to be Transported and/or Disposed of Onshore.*"

(e) Vicinity Map

Enclosed is a vicinity map showing the location of the activities proposed herein relative to the shoreline with the distance of the proposed activities from the shoreline and the primary route(s) of the support vessels and aircraft that will be used when traveling between the onshore support facilities and the drilling unit.

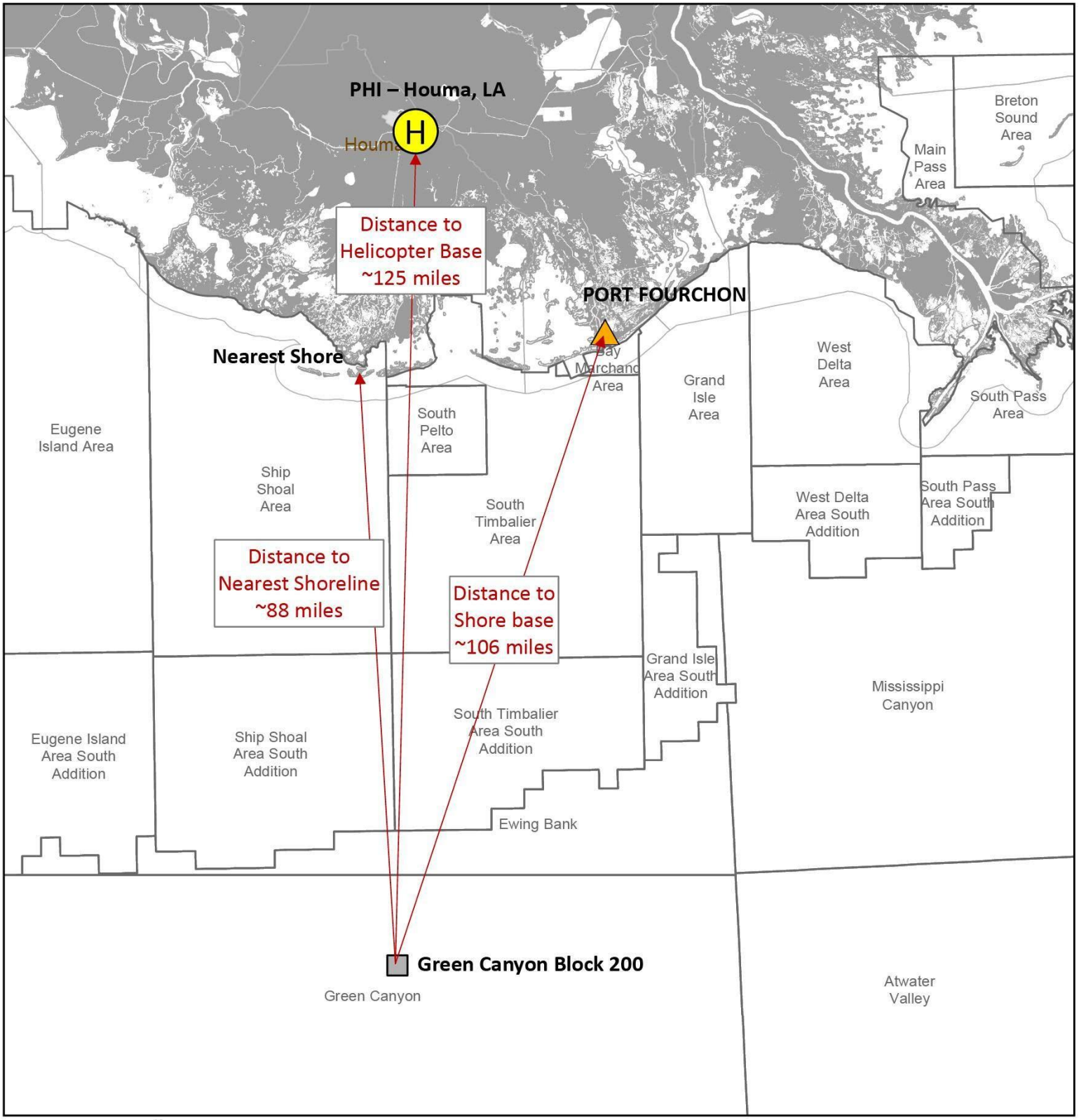
Attachments

1) Table 2, "Waste and Surplus Estimated to be Transported and/or Disposed of Onshore" (*Attachment K-1*)
2) Vicinity Map (*Attachment K-2*)

TABLE 2. WASTE AND SURPLUS ESTIMATED TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

please specify whether the amount reported is a total or per well

	Projected generated waste		Solid and Liquid Wastes transportation	Waste Disposal		
Type of Waste	**Composition**		**Transport Method**	**Name/Location of Facility**	**Amount**	**Disposal Method**
Will drilling occur ? If yes, fill in the muds and cuttings.						
EXAMPLE: Synthetic-based drilling fluid or mud	*internal olefin, ester*		*Below deck storage tanks on offshore support vessels*	*Newport Environmental Services Inc., Ingleside, TX*	*X bbl/well*	*Recycled*
Oil-based drilling fluid or mud	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Synthetic-based drilling fluid or mud	**IO base, Emulsifiers, CaCL2, Fresh Water, brine, FLC, Barite, CACO3**		**Transport via below deck storage tanks in Offshore Support Vessels(OSV)**	**Newpark Fluid Systems, Port Fourchon, LA**	**7,000 bbls.**	**Returned for credit**
Cuttings wetted with Water-based fluid	**Formation Solids**		**N/A**	**N/A**	**3398 bbls**	**Discharge Overboard per NPDES permit**
Cuttings wetted with Synthetic-based fluid	**Formation Solids**		**N/A**	**N/A**	**6779 bbls**	**Discharge Overboard per NPDES permit**
Cuttings wetted with oil-based fluids	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Will you produce hydrocarbons? If yes fill in for produced sand.						
Produced sand	**N/A**		**N/A**	**N/A**	**N/A**	**N/A**
Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows.						
EXAMPLE: trash and debris (recylables)	*Plastic, paper, aluminum*		*barged in a storage bin*	*ARC, New Iberia, LA*	*X lb/well*	*Recycled*
Trash and debris	**Plastic, paper, aluminum**		**Storage Binsto shorebase; Trucked to recycling facility**	**Martin North-Galliano Waste**	**4,500 cu ft.**	**Recycled**
Used oil	**Various lubricating Oils**		**Storage Binsto shorebase; Trucked to recycling facility**	**Drilling contractor Resposible. Port Fourchon**	**100-125 bbls.**	**Recycled**
Wash water	**Fresh or Seawater**		**N/A**	**N/A**	**N/A**	**Discharge Overboard per NPDES Permit**
Chemical product wastes	**Various Drilling Waste**		**Environmental Drum/Tote Tanks to Shorebase: Trucked to Recycling facility as reqd if not via OSV**	**OSV, Rig & Tote Tank Cleaned by Tiger, HydroChem, PSC, Clean Tanks w/ processing via Ecoserve& R360 @ Port Fouchon**	**1500 bbls.**	**Recycled or Disposal**
NOTE: If you will not have a type of waste, enter NA in the row.						



N
W E
S

0 20
MILES

Projection: UTM 15 N
Datum: NAD 27
Distance Units: Feet US

FIELDWOOD ENERGY

GC200 Vicinity Plat

OCS-G 12209
Green Canyon 200
Gulf of Mexico

Attachment K-2

SECTION L
ONSHORE SUPPORT FACILITIES INFORMATION

(a) General

The table below is the onshore facilities that will be used to provide supply and service support for the proposed activities under this plan:

Name	Location	Existing/New/Modified
Fieldwood Deepwater Shorebase OSS Dock / Port Fourchon	180 First Street Golden Meadow, LA 70357	Existing
PHI Heliport	Houma, LA	Existing

The distance from the PHI Heliport to the proposed activities under this plan is 125 miles. The location and distance is depicted on the vicinity map enclosed under Section K of this plan.

(b) Air Emissions

Type of Vessel	Maximum Fuel Tank Capacity	Maximum Number in Area at Any Time	Trip Frequency or Duration
Crew Boat	400 bbls	1	4 trips / week
Supply Boat	2,380 bbls	1	3 trips / week
Helicopter	760 gallons	1	As Needed

(c) Unusual Solid and Liquid Wastes

Fieldwood does not plan to utilize any unusual solid or liquid wastes other than what is described in our NPDES permit.

(d) Waste Disposal

Please see Table 2 titled, "*Waste and Surplus Estimated to be Transported and/or Disposed of Onshore*" enclosed under Section K of this plan.

SECTION M
COASTAL ZONE MANAGEMENT (CZM) INFORMATION

New CZM Consistency Statements are not being provided per NTL No. 2008-G04 as this is not an Initial EP; the state of Florida and Alabama are not affected states; a new multi-well structure is not being proposed; and the revisions proposed under this S-EP will not result in a significant change in the impacts previously identified, evaluated, and approved.

SECTION N
ENVIRONMENTAL IMPACT ANALYSIS (EIA)

In accordance with the requirements of 30 CFR 550.269, an Environmental Impact Analysis (EIA) is enclosed under this section.

Attachments

1) Environmental Impact Analysis (*Attachment N-1*)

Fieldwood Energy Offshore LLC (Fieldwood)

Supplemental Exploration Plan
Green Canyon Block 200
OCS-G 12209

(A) IMPACT PRODUCING FACTORS

ENVIRONMENTAL IMPACT ANALYSIS WORKSHEET

Environment Resources	Impact Producing Factors (IPFs) Categories and Examples Refer to recent GOM OCS Lease Sale EIS for a more complete list of IPFs					
	Emissions (air, noise, light, etc.)	Effluents (muds, cutting, other discharges to the water column or seafloor)	Physical disturbances to the seafloor (rig or anchor emplacements, etc.)	Wastes sent to shore for treatment or disposal	Accidents (e.g., oil spills, chemical spills, H_2S releases)	Discarded Trash & Debris
Site-specific at Offshore Location						
Designated topographic features		(1)	(1)		(1)	
Pinnacle Trend area live bottoms		(2)	(2)		(2)	
Eastern Gulf live bottoms		(3)	(3)		(3)	
Benthic communities			(4)			
Water quality		X	X		X	
Fisheries		X	X		X	
Marine Mammals	X(8)	X			X(8)	X
Sea Turtles	X(8)	X			X(8)	X
Air quality	X(9)					
Shipwreck sites (known or potential)			X(7)			
Prehistoric archaeological sites			X(7)			
Vicinity of Offshore Location						
Essential fish habitat		X	X		X(6)	
Marine and pelagic birds	X				X	X
Public health and safety					(5)	
Coastal and Onshore						
Beaches					X(6)	X
Wetlands					X(6)	
Shore birds and coastal nesting birds					X(6)	X
Coastal wildlife refuges					X	
Wilderness areas					X	

Footnotes for Environmental Impact Analysis Matrix

1) Activities that may affect a marine sanctuary or topographic feature. Specifically, if the well or platform site or any anchors will be on the seafloor within the:
   - 4-mile zone of the Flower Garden Banks, or the 3-mile zone of Stetson Bank;
   - 1000-m, 1-mile or 3-mile zone of any topographic feature (submarine bank) protected by the Topographic Features Stipulation attached to an OCS lease;
   - Essential Fish Habitat (EFH) criteria of 500 ft. from any no-activity zone; or
   - Proximity of any submarine bank (500 ft. buffer zone) with relief greater than 2 meters that is not protected by the Topographic Features Stipulation attached to an OCS lease.
2) Activities with any bottom disturbance within an OCS lease block protected through the Live Bottom (Pinnacle Trend) Stipulation attached to an OCS lease.
3) Activities within any Eastern Gulf OCS block where seafloor habitats are protected by the Live Bottom (Low-Relief) Stipulation attached to an OCS lease.
4) Activities on blocks designated by the BOEM as being in water depths 300 meters or greater.
5) Exploration or production activities where H2S concentrations greater than 500 ppm might be encountered.
6) All activities that could result in an accidental spill of produced liquid hydrocarbons or diesel fuel that you determine would impact these environmental resources. If the proposed action is located a sufficient distance from a resource that no impact would occur, the EIA can note that in a sentence or two.
7) All activities that involve seafloor disturbances, including anchor emplacements, in any OCS block designated by the BOEM as having high-probability for the occurrence of shipwrecks or prehistoric sites, including such blocks that will be affected that are adjacent to the lease block in which your planned activity will occur. If the proposed activities are located a sufficient distance from a shipwreck or a prehistoric site that no impact would occur, the EIA can note that in a sentence or two.
8) All activities that you determine might have an adverse effect on endangered or threatened marine mammals or sea turtles or their critical habitats.
9) Production activities that involve transportation of produced fluids to shore using shuttle tankers or barges.

(B) ANALYSIS

Site-Specific at Green Canyon Block 200

Proposed operations consist of the drilling and completion of six wells (TA010, TA012, TA014, TA016, TA017, and TA018) in Green Canyon Block 200.

Operations will be conducted with a DP drillship or DP semisubmersible rig.

1. Designated Topographic Features

Potential IPFs on topographic features include physical disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Green Canyon Block 200 is not one of the identified blocks affected by the topographic features stipulation; therefore, no adverse impacts are expected.

Effluents: Green Canyon Block 200 is not one of the identified blocks affected by the topographic features stipulation; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to benthic organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on corals. Because the crests of topographic features in the Northern Gulf of Mexico are found below 10 m, no oil from a surface spill could reach their sessile biota. Oil from a subsurface spill is not applicable due to the distance of these blocks from a topographic area. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions and wastes sent to shore for disposal) from the proposed activities, which could impact topographic features.

2. Pinnacle Trend Area Live Bottoms

Potential IPFs on pinnacle trend area live bottoms include physical disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Green Canyon Block 200 is not one of the identified blocks affected by the live bottom (pinnacle trend) stipulation; therefore, no adverse impacts are expected.

Effluents: Green Canyon Block 200 is not one of the identified blocks affected by the live bottom (pinnacle trend) stipulation; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills have the potential to foul benthic communities and cause lethal and sublethal effects on live bottom organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine organisms. Oil from a subsurface spill is not applicable due to the distance of these blocks from a live bottom (pinnacle trend) area. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions and wastes sent to shore for disposal) from the proposed activities which could impact a live bottom (pinnacle trend) area.

3. Eastern Gulf Live Bottoms

Potential IPFs on Eastern Gulf live bottoms include physical disturbances to the seafloor, effluents, and accidents.

Physical disturbances to the seafloor: Green Canyon Block 200 is not located in an area characterized by the existence of live bottoms, and this lease does not contain a Live-Bottom Stipulation requiring a photo documentation survey and survey report.

Effluents: Green Canyon Block 200 is not located in an area characterized by the existence of live bottoms; therefore, no adverse impacts are expected.

Accidents: It is unlikely that an accidental surface or subsurface spill would occur from the proposed activities (refer to statistics in **Item 5**, Water Quality). Oil spills cause damage to live bottom organisms only if the oil contacts the organisms. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10 m depth. At this depth, the oil is found only at concentrations several orders of magnitude lower than the amount shown to have an effect on marine invertebrates. Oil from a subsurface spill is not applicable due to the distance of these blocks from a live bottom area. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions and wastes sent to shore for disposal) from the proposed activities which could impact an Eastern Gulf live bottom area.

4. Benthic Communities

Green Canyon 200 is located in water depths 984 feet (300 meters) or greater. IPFs that could result in impacts to benthic communities from the proposed activities include physical disturbances to the seafloor.

Physical disturbances to the seafloor: Green Canyon 200 is not a known benthic community site, as listed in NTL 2009-G40. This Supplemental Exploration Plan submittal includes the required maps, analyses, and statement(s). The proposed activities will be contacted in accordance with NTL 2009-G40, which will ensure that features or areas that could support high-density benthic communities will not be impacted.

There are no other IPFs (including emissions, effluents, wastes sent to shore for disposal, or accidents) from the proposed activities which could impact benthic communities.

5. Water Quality

IPFs that could result in water quality degradation from the proposed operations in Green Canyon Block 200 include disturbances to the seafloor, effluents and accidents.

Physical disturbances to the seafloor: Bottom area disturbances resulting from the emplacement of drill rigs, the drilling of wells and the installation of platforms and pipelines would increase water-column turbidity and re-suspension of any accumulated pollutants, such as trace metals and excess nutrients. This would cause short-lived impacts on water quality conditions in the immediate vicinity of the emplacement operations.

Effluents: Levels of contaminants in drilling muds and cuttings and produced water discharges, discharge-rate restrictions and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to water quality.

Accidents: Oil spills have the potential to alter offshore water quality; however, it is unlikely that an accidental surface or subsurface spill would occur from the proposed activities. Between 1980 and 2000, OCS operations produced 4.7 billion barrels of oil and spilled only 0.001 percent of this oil, or 1 barrel for every 81,000 barrels produced. The spill risk related to a diesel spill from drilling operations is even less. Between 1976 and 1985, (years for which data were collected), there were 80 reported diesel spills greater than one barrel associated with drilling activities. Considering that there were 11,944 wells drilled, this is a 0.7 percent probability of an occurrence. If a spill were to occur, the water quality of marine waters would be temporarily affected by the dissolved components and small oil droplets. Dispersion by currents and microbial degradation would remove the oil from the water column and dilute the constituents to background levels. Historically, changes in offshore water quality from oil spills have only been detected during the life of the spill and up to several months afterwards. Most of the components of oil are insoluble in water and therefore float. The activities proposed in this plan will be covered by Fieldwood's Regional Oil Spill Response Plan (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions, physical disturbances to the seafloor, and wastes sent to shore for disposal) from the proposed activities which could cause impacts to water quality.

6. Fisheries

IPFs that could cause impacts to fisheries as a result of the proposed operations in Green Canyon Block 200 include physical disturbances to the seafloor, effluents and accidents.

Physical disturbances to the seafloor: The emplacement of a structure or drilling rig results in minimal loss of bottom trawling area to commercial fishermen. Pipelines cause gear conflicts which result in losses of trawls and shrimp catch, business downtime and vessel damage. Most financial losses from gear conflicts are covered by the Fishermen's Contingency Fund (FCF). The emplacement and removal of facilities are not expected to cause significant adverse impacts to fisheries.

Effluents: Effluents such as drilling fluids and cuttings discharges contain components and properties which are detrimental to fishery resources. Moderate petroleum and metal contamination of sediments and the water column can occur out to several hundred meters down-current from the discharge point. Offshore discharges are expected to disperse and dilute to very near background levels in the water column or on the seafloor within 3,000 m of the discharge point, and are expected to have negligible effect on fisheries.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on fisheries; however, it is unlikely that such an event would occur from the proposed activities (refer to **Item 5**, Water Quality). The effects of oil on mobile adult finfish or shellfish would likely be sublethal and the extent of damage would be reduced to the capacity of adult fish and shellfish to avoid the spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

There are no IPFs from emissions, or wastes sent to shore for disposal from the proposed activities which could cause impacts to fisheries.

7. Marine Mammals

GulfCet II studies revealed that cetaceans of the continental shelf and shelf-edge were almost exclusively bottlenose dolphin and Atlantic spotted dolphin. Squid eaters, including dwarf and pygmy killer whale, Risso's dolphin, rough-toothed dolphin, and Cuvier's beaked whale, occurred most frequently along the upper slope in areas outside of anticyclones. IPFs that could cause impacts to marine mammals as a result of the proposed operations in Green Canyon Block 200 include emissions, effluents, discarded trash and debris, and accidents.

Emissions: Noises from drilling activities, support vessels and helicopters may elicit a startle reaction from marine mammals. This reaction may lead to disruption of marine mammals' normal activities. Stress may make them more vulnerable to parasites, disease, environmental contaminants, and/or predation (Majors and Myrick, 1990). There is little conclusive evidence for long-term displacements and population trends for marine mammals relative to noise.

Effluents: Drilling fluids and cuttings discharges contain components which may be detrimental to marine mammals. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of debris have caused the death or serious injury of marine mammals (Laist, 1997; MMC, 1999). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm marine mammals. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA).

Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and cetaceans would be unusual events, however should one occur, death or injury to marine mammals is possible. Contract vessel operators can avoid marine mammals and reduce potential deaths by maintaining a vigilant watch for marine mammals and maintaining a safe distance when they are sighted. Vessel crews should use a reference guide to help identify the twenty-eight species of whales and dolphins, and the single species of manatee that may be encountered in the Gulf of Mexico OCS. Vessel crews must report sightings of any injured or dead protected marine mammal species immediately,

regardless of whether the injury or death is caused by their vessel, to the Marine Mammal and Sea Turtle Stranding Hotline at (888) 404-3922, the NMFS Southeast Regional Office at (727) 824-5312, or the Marine Mammal Stranding Network at (305) 862-2850. In addition, if the injury or death was caused by a collision with a contract vessel, the BOEM must be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

Oil spills have the potential to cause sublethal oil-related injuries and spill-related deaths to marine mammals. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to changes in cetacean behavior and/or distribution, thereby causing additional stress to the animals. The effect of oil dispersants on cetaceans is not known. The acute toxicity of oil dispersant chemicals included in Fieldwood's OSRP is considered to be low when compared with the constituents and fractions of crude oils and diesel products. The activities proposed in this plan will be covered by Fieldwood's OSRP (refer to information submitted in accordance with **Appendix H**).

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities which could impact marine mammals.

8. Sea Turtles

IPFs that could cause impacts to sea turtles as a result of the proposed operations include emissions, effluents, discarded trash and debris, and accidents. GulfCet II studies sighted most loggerhead, Kemp's ridley and leatherback sea turtles over shelf waters. Historically these species have been sighted up to the shelf's edge. They appear to be more abundant east of the Mississippi River than they are west of the river (Fritts et al., 1983b; Lohoefener et al., 1990). Deep waters may be used by all species as a transitory habitat.

Emissions: Noise from drilling activities, support vessels, and helicopters may elicit a startle reaction from sea turtles, but this is a temporary disturbance.

Effluents: Drilling fluids and cuttings discharges are not known to be lethal to sea turtles. Most operational discharges are diluted and dispersed upon release. Any potential impact from drilling fluids would be indirect, either as a result of impacts on prey items or possibly through ingestion in the food chain (API, 1989).

Discarded trash and debris: Both entanglement in, and ingestion of, debris have caused the death or serious injury of sea turtles (Balazs, 1985). The limited amount of marine debris, if any, resulting from the proposed activities is not expected to substantially harm sea turtles. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies

including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

Accidents: Collisions between support vessels and sea turtles would be unusual events, however should one occur, death or injury to sea turtles is possible. Contract vessel operators can avoid sea turtles and reduce potential deaths by maintaining a vigilant watch for sea turtles and maintaining a safe distance when they are sighted. Vessel crews should use a reference guide to help identify the five species of sea turtles that may be encountered in the Gulf of Mexico OCS. Vessel crews must report sightings of any injured or dead protected sea turtle species immediately, regardless of whether the injury or death is caused by their vessel, to the Marine Mammal and Sea Turtle Stranding Hotline at (888) 404-3922, the NMFS Southeast Regional Office at (727) 824-5312, or the Marine Mammal Stranding Network at (305) 862-2850. In addition, if the injury or death was caused by a collision with a contract vessel, the BOEM must be notified within 24 hours of the strike by email to protectedspecies@bsee.gov. If the vessel is the responsible party, it is required to remain available to assist the respective salvage and stranding network as needed.

All sea turtle species and their life stages are vulnerable to the harmful effects of oil through direct contact or by fouling of their food. Exposure to oil can be fatal, particularly to juveniles and hatchlings. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Oil spill response activities may increase vessel traffic in the area, which could add to the possibility of collisions with sea turtles. The activities proposed in this plan will be covered by Fieldwood's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

There are no other IPFs (including physical disturbances to the seafloor) from the proposed activities which could impact sea turtles.

9. Air Quality

Green Canyon Block 200 is located 152 miles from the Breton Wilderness Area and 88 miles from shore. Applicable emissions data is included in **Appendix G** of the Plan.

There would be a limited degree of air quality degradation in the immediate vicinity of the proposed activities. Plan Emissions for the proposed activities do not exceed the annual exemption levels as set forth by BOEM. Accidents and blowouts can release hydrocarbons or chemicals, which could cause the emission of air pollutants. However, these releases would not impact onshore air quality because of the prevailing atmospheric conditions, emission height, emission rates, and the distance of Green Canyon Block 200 from the coastline. There are no other IPFs (including effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal) from the proposed activities which would impact air quality.

10. Shipwreck Sites (known or potential)

IPFs that could cause impacts to known or unknown shipwreck sites as a result of the proposed operations in Green Canyon Block 200 are disturbances to the seafloor.

Physical Disturbances to the seafloor: Green Canyon Block 200 is not located within the area designated by BOEM as high-probability for occurrence of shipwrecks. Fieldwood will report to BOEM the discovery of any evidence of a shipwreck and make every reasonable effort to preserve and protect that cultural resource.

Accidents: An accidental oil spill has the potential to cause some detrimental effects to shipwreck sites if the release were to occur subsea. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Fieldwood's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

There are no other IPFs (including emissions, effluents, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to shipwreck sites.

11. Prehistoric Archaeological Sites

IPFs that could cause impacts to prehistoric archaeological sites as a result of the proposed operations in Green Canyon Block 200 are physical disturbances to the seafloor and accidents (oil spills).

Physical Disturbances to the seafloor: Green Canyon Block 200 is located inside the Archaeological Prehistoric high probability lines. Fieldwood will report to BOEM the discovery of any object of prehistoric archaeological significance and make every reasonable effort to preserve and protect that cultural resource.

Accidents: An accidental oil spill has the potential to cause some detrimental effects to prehistoric archaeological sites if the release were to occur subsea. However, it is unlikely that an accidental oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Fieldwood's Regional Oil Spill Response Plan (refer to information submitted in accordance with **Appendix H**).

There are no other IPFs (including emissions, effluents, wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to prehistoric archaeological sites.

Vicinity of Offshore Location

1. Essential Fish Habitat (EFH)

IPFs that could cause impacts to EFH as a result of the proposed operations in Green Canyon Block 200 include physical disturbances to the seafloor, effluents and accidents. EFH includes all estuarine and marine waters and substrates in the Gulf of Mexico.

Physical disturbances to the seafloor: The Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation would prevent most of the potential impacts on live-bottom communities and EFH from bottom disturbing activities (e.g., anchoring, structure emplacement and removal).

Effluents: The Live Bottom Low Relief Stipulation, the Live Bottom (Pinnacle Trend) Stipulation, and the Eastern Gulf Pinnacle Trend Stipulation would prevent most of the potential impacts on live-bottom communities and EFH from operational waste discharges. Levels of contaminants in drilling muds and cuttings and produced-water discharges, discharge-rate restrictions, and monitoring and toxicity testing are regulated by the EPA NPDES permit, thereby eliminating many significant biological or ecological effects. Operational discharges are not expected to cause significant adverse impacts to EFH.

Accidents: An accidental oil spill has the potential to cause some detrimental effects on EFH. Oil spills that contact coastal bays and estuaries, as well as OCS waters when pelagic eggs and larvae are present, have the greatest potential to affect fisheries. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

There are no other IPFs (including emissions, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact essential fish habitat.

2. Marine and Pelagic Birds

IPFs that could impact marine birds as a result of the proposed activities include air emissions, accidental oil spills, and discarded trash and debris from vessels and the facilities.

Emissions: Emissions of pollutants into the atmosphere from these activities are far below concentrations which could harm coastal and marine birds.

Accidents: An oil spill would cause localized, low-level petroleum hydrocarbon contamination. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Marine and pelagic birds feeding at the spill location may experience chronic, nonfatal, physiological stress. It is expected that few, if any, coastal and marine birds would actually be affected to that extent. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Marine and pelagic birds could become entangled and snared in discarded trash and debris, or ingest small plastic debris, which can cause permanent injuries and death. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass. Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE. Debris, if any, from these proposed activities will seldom interact with marine and pelagic birds; therefore, the effects will be negligible.

There are no other IPFs (including effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact marine and pelagic birds.

3. Public Health and Safety Due to Accidents

There are no IPFs (emissions, effluents, physical disturbances to the seafloor, wastes sent to shore for treatment or disposal or accidents, including an accidental H2S releases) from the proposed activities which could cause impacts to public health and safety. In accordance with NTL No.'s 2008-G04, 2009-G27, and 2009-G31, sufficient information is included in **Appendix D** to justify our request that our proposed activities be classified by BSEE as H2S absent.

Coastal and Onshore

1. Beaches

IPFs from the proposed activities that could cause impacts to beaches include accidents (oil spills) and discarded trash and debris.

Accidents: Oil spills contacting beaches would have impacts on the use of recreational beaches and associated resources. Due to the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Trash on the beach is recognized as a major threat to the enjoyment and use of beaches. There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities which could impact beaches.

2. Wetlands

Salt marshes and seagrass beds fringe the coastal areas of the Gulf of Mexico. Due to the distance from shore (88 miles), accidents (oil spills) and discarded trash and debris represent IPFs which could impact these resources.

Accidents: Level of impact from an oil spill will depend on oil concentrations contacting vegetation, kind of oil spilled, types of vegetation affected, season of the year, pre-existing stress level of the vegetation, soil types, and numerous other factors. Light-oiling impacts will cause plant die-back with recovery within two growing seasons without artificial replanting. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water quality). If a spill were to occur, response capabilities as outlined in Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**) would be implemented.

Discarded trash and debris: There will only be a limited amount of marine debris, if any, resulting from the proposed activities. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on all vessels and facilities having sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to wetlands.

3. Shore Birds and Coastal Nesting Birds

Accidents: Oil spills could cause impacts to shore birds and coastal nesting birds. The birds most vulnerable to direct effects of oiling include those species that spend most of their time swimming on and under the sea surface, and often aggregate in dense flocks (Piatt et al., 1990; Vauk et al., 1989). Coastal birds, including shorebirds, waders, marsh birds, and certain water fowl, may be the hardest hit indirectly through destruction of their feeding habitat and/or food source (Hansen, 198l; Vermeer and Vermeer, 1975). Direct oiling of coastal birds and certain seabirds is usually minor; many of these birds are merely stained as a result of their foraging behaviors. Birds can ingest oil when feeding on contaminated food items or drinking contaminated water.

Oil-spill cleanup operations will result in additional disturbance of coastal birds after a spill. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water quality). Due to the distance from shore being 88 miles, Fieldwood would immediately implement the response capabilities outlined in their Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Shore birds and coastal nesting birds are highly susceptible to entanglement in floating, submerged, and beached marine debris: specifically plastics. Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to shore birds and coastal nesting birds.

4. Coastal Wildlife Refuges

Accidents: It is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water quality). Response capabilities would be implemented, no impacts are expected. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H**).

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to coastal wildlife refuges.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to coastal wildlife refuges.

5. Wilderness Areas

Accidents: An accidental oil spill from the proposed activities could cause impacts to wilderness areas. However, it is unlikely that an oil spill would occur from the proposed activities (refer to **Item 5**, Water Quality). Due to the distance from the nearest designated Wilderness Area (152 miles) and the response capabilities that would be implemented, no significant adverse impacts are expected. The activities proposed in this plan will be covered by Fieldwood's Regional OSRP (refer to information submitted in **Appendix H).**

Discarded trash and debris: Operators are prohibited from deliberately discharging debris as mandated by MARPOL-Annex V, the Marine Plastic Pollution Research and Control Act and regulations imposed by various agencies including the United States Coast Guard (USCG) and the Environmental Protection Agency (EPA). Fieldwood will operate in accordance with the regulations and also avoid accidental loss of solid waste items by maintaining waste management plans, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. Special caution will be exercised when handling and disposing of small items and packaging materials, particularly those made of non-biodegradable, environmentally persistent materials such as plastic or glass.

Informational placards will be posted on vessels and every facility that has sleeping or food preparation capabilities. All offshore personnel, including contractors and other support services-related personnel (e.g. helicopter pilots, vessel captains and boat crews) will be indoctrinated on waste procedures, and will view the video (or Microsoft PowerPoint presentation), "Think About It" (*previously "All Washed Up: The Beach Litter Problem"*). Thereafter, all personnel will view the marine trash and debris training video annually. Offshore personnel will also receive an explanation from Fieldwood management or the designated lease operator management that emphasizes their commitment to waste management in accordance with NTL No. 2015-G03-BSEE.

There are no other IPFs (emissions, effluents, physical disturbances to the seafloor, or wastes sent to shore for treatment or disposal) from the proposed activities that could cause impacts to wilderness areas.

6. Other Environmental Resources Identified

There are no other environmental resources identified for this impact assessment.

(C) IMPACTS ON PROPOSED ACTIVITIES

The site–specific environmental conditions have been taken into account for the proposed activities. No impacts are expected on the proposed activities from site-specific environmental conditions.

(D) ENVIRONMENTAL HAZARDS

During the hurricane season, June through November, the Gulf of Mexico is impacted by an average of ten tropical storms (39-73 mph winds), of which six become hurricanes (greater than 74 mph winds). Due to its location in the gulf, Green Canyon Block 200 may experience hurricane and tropical storm force winds, and related sea currents. These factors can adversely impact the integrity of the operations covered by this plan. A significant storm may present physical hazards to operators and vessels, damage exploration or production equipment, or result in the release of hazardous materials (including hydrocarbons). Additionally, the displacement of equipment may disrupt the local benthic habitat and pose a threat to local species.

The following preventative measures included in this plan may be implemented to mitigate these impacts:

1. Drilling & completion
    a. Secure well
    b. Secure rig / platform
    c. Evacuate personnel

Drilling activities will be conducted in accordance with NTL No.'s 2008-G09, 2009-G10, and 2010-N10.

2. Structure Installation
   Operator will not conduct structure installation operations during Tropical Storm or Hurricane threat.

(E) ALTERNATIVES

No alternatives to the proposed activities were considered to reduce environmental impacts.

(F) MITIGATION MEASURES

No mitigation measures other than those required by regulation will be employed to avoid, diminish, or eliminate potential impacts on environmental resources.

(G) CONSULTATION

No agencies or persons were consulted regarding potential impacts associated with the proposed activities. Therefore, a list of such entities has not been provided.

(H) PREPARER(S)

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(I) REFERENCES

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Although not cited, the following were utilized in preparing this EIA:

- Hazard Surveys
- BOEM EIS's:
  - GOM Deepwater Operations and Activities. Environmental Assessment (MMS 2000-00)
  - GOM Central and Western Planning Areas Sales 166 and 168 Final Environmental Impact Statement (MMS 96-0058)

SECTION O
ADMINISTRATIVE INFORMATION

(a) Exempted Information Description

The proposed bottom-hole location of the planned well has been removed from the public information copy of the S-EP as well as any discussions of the target objectives, geologic or geophysical data, and any interpreted geology.

(b) Bibliography

- Supplemental Exploration Plan Control No. S-7899 approved on 09/21/2018
- Revised Exploration Plan Control No. R-6772 approved on 11/19/2018
- Revised Exploration Plan Control No. R-6856 approved on 07/19/2019
- "AUV/3D Seismic Shallow Hazard and Archaeological Report" by Oceaneering International, Inc [BOEM assigned Survey No. 24200]